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THE WORLD'S LEADING R/C CAR MAGAZINE
November 1998

BUDGET RADIO GUIDE
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MRC's 1/8+ scale Piston Pounder
with electric start!

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Kyosho Nitro Blizzard

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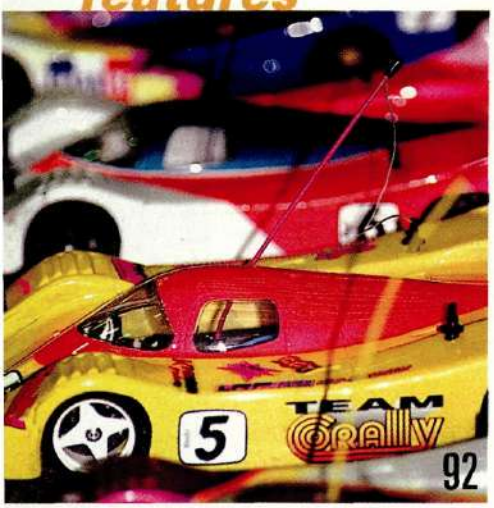
features



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ON THE COVER (from top): MRC's Nitro Thunder King tears up the BMX track; the Kyosho Nitro Blizzard hits the dusty trail; and *R/C Car Action*'s Associated RC10GT Project Truck gives a two-wheel salute (all photos by Walter Sidas).

It's Official.

David Spashett *owns* on-road R/C racing. David went to the Worlds and won it all; 1/12 scale; 1/10 scale; Touring Car. David all the way. Amazing. That's the biggest news out of the **IFMAR On-Road World Championships**, but certainly not the only story to be told. George Gonzalez has all the hot news (and hot cars) in his exhaustive Worlds coverage, with plenty of color photos, interviews and behind-the-scenes stuff. We know you're dying to see the championship-winning hardware, so we even have in-depth looks at the **Worlds Winning Cars** so you can set up just like David Spashett. Now if only you could *drive* like David Spashett ....

Closer to home, senior editor Steve Pond has been yammering nonstop about his **Project RC10GT** ideas since his first day back in the offices of *Radio Control Car Action*. Now that the article is in print, maybe Steve will get over his compulsion! Wisecracks aside, Steve has built up one cool GT, and I know a lot of you guys out there are running this popular Associated vehicle. Plan to be inspired when you check it out!

Whether your car is a tricked-out truck like Steve's or your first foray into R/C vehicles, you're going to need a radio to put the "R" into R/C. This month, all the "budget" pistol-grip radios are rounded up in our aptly named **Budget Radio Guide**. You oughta know how these things work by now; we have all the specs, how-to-choose info, and more stuff you gotta know so you can head to the hobby shop with confidence.

If it's hot new cars you're after, we have some great "Thrash Tests" for you. Senior West Coast editor George Gonzalez has logged tons o' transmitter time in the SoCal scene with the **Yokomo YR-4M2 USA**, and he spills the beans on the latest Yoke pavement-pounder. Yours truly took to the track with the **HPI RS4 Mini Pro** (it's a *missile*), as well as a unique vehicle that I believe is long overdue: the **MRC Nitro Thunder King**. It might be the ultimate big-air, can't-break-it, go-anywhere fun machine! But hey, that's only three of the *six* vehicle reviews in the issue. You want "Thrash Tests"? You got 'em.

Enjoy the issue and don't be shy about letting us know what you think. That's what email is for!

Peter Vieira

Peter Vieira (peterv@airage.com)
Editor

Radio Control CAR ACTION

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WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Air Age Inc., *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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I Really Wanna Rally

Hey, wassup? I have two questions; one regarding my car and one regarding radios. I own an HPI RS4 Sport, and now I see that HPI has a great-looking rally car that I hope to get. But since both cars are RS4s, would it be possible for me just to buy the Subaru rally car body, wheels and tires, and then convert my HPI RS4 Sport to the new rally car? Oh, and I wanted to know your opinion on this: which radios are better—pistol-grip or two-stick? Thanks for your help! [email]
VORTEX 23

Yes, you certainly can put HPI's new Impreza body and "mesh" wheels on your RS4 Sport, but that will only give you the Rally *look*. For the full rally experience, you'll also need the RS4 Rally's longer shocks, skid plate front bumper and Lexan undertray/interior set. As for radios, I don't believe there is an advantage to either type, although I do feel that pistol grips are easier to operate and allow more intuitive control. Stick radios are popular in Europe, however, and many notable pros (such as Masami Hirosaka) drive exclusively with sticks.
—Chris

Shoot that Golden Arrow

I have an old, electric Golden Arrow racing buggy made by RadioShack. It's about six years old, and I still use the original battery (Ni-Cd 7.2 volts, 1200mAh). As far as add-ons or hop-ups, I haven't done a thing to it. I have lots of fun with it, but sometimes when I'm going full throttle (17mph), the car just dies and the wheels turn to the left. I can't figure out why this happens and would like your help. The only way to get the car going again is by shaking the radio or turning it off for 20 seconds. The car runs fine for 7 or 8 minutes and then it does the same thing all over again; it's really frustrating. Also, I just started getting your magazine, and I wonder if there are any hop-ups for this kind of machine.
ANDY ROWE
Tiverton, RI

It has been six years, Andy; I think you should lay the Golden Arrow to rest and get a new car. Once a toy-type R/C car goes bad, it generally isn't repairable, especially when the vehicle is as old as yours. As for hop-ups, there really aren't any for toy vehicles. You might be able to get creative and replace some bushings with bearings, but even that's doubtful; many toy cars have axles and gears that simply spin on the plastic gearbox case or hubs without any sort of replaceable bushing to wear on. If you managed to get six years from your Golden Arrow, you should get a lifetime out of a hobby-quality kit.

Have fun out there in Tiverton—maybe I'll bump into you at Gray's Ice Cream the next time I visit my folks. Best ice cream in the Ocean State!
—Pete

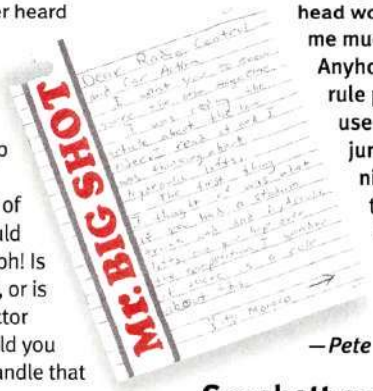
Know When to Say When

I have been into this hobby for 12 years, off and on, but I have really been bitten by the racing bug for the last couple of years. Anyway, my question is: to what voltage should you charge a 6-cell, 7.2V battery? I have heard 9.5 volts; is this correct? Also, to what voltage should you discharge it—is 4.5 volts right? As I was saying, I have been in this hobby for years but have never seen or heard the correct answers to these questions. I think it is important to let people know—especially beginners. Otherwise, people might ruin their batteries just because they don't know when to stop charging or discharging.
CRAIG REDIKER
Barnard, VT

Craig, you don't need to stop charging a pack at any certain voltage, as long as you disconnect the pack when the voltage starts to drop. If you're using a digital voltmeter (DVM) to monitor your packs, you'll notice that voltage will rise to a certain point (anywhere from 9 to 11 volts, depending on the pack and charger), then begin to go down. It's normal for the voltage to fluctuate, but once the DVM shows the voltage decreasing steadily, the pack has "peaked" and is fully charged. It should also be warm (toasty warm, not hot); if you don't have a DVM, this temperature change can be used as the indicator for a full charge. Discharging is a little different; if you're using discharge bulbs, you should disconnect the pack just before the lights go out. Several companies offer cutoff devices that shut the lights off for you when the pack voltage drops below between 4.5 and 5.5 volts. If you don't have any other method of discharging a pack besides running it in the car, that's fine. Run the car until the battery can no longer propel it, and it will be discharged enough. Battery care can be much more complex than described here, but the simple precautions of disconnecting a pack before it overcharges, discharging the pack completely (on bulbs or in the car), and recharging only after the pack has cooled will keep your batteries in good shape.
—Pete

SuperTen Fan

Thanks for the great comparison on Tamiya's TGX and Kyosho's SuperTen. I've always wondered how those two machines would do head to head. I'm 16 and own a SuperTen. And yes, it is one of the best 1/10-scale R/C cars out there. Greg Vogel talked about putting a race engine on a SuperTen to make it faster than the TGX. Which engine would he put on the SuperTen? I had been thinking about this for a while but had never heard anyone else mention it. I am considering a Serpent SX-15; it will crank out 0.6hp at a crazy 40,000 rpm! With the gear of the 2-speed, it would go more than 45mph! Is that a little overkill, or is it just what the doctor ordered? How would you set up the car to handle that extra speed?
AARON HINES
Boone, NC



Aaron, I would say it's overkill—*and* what the doctor ordered! Short of a .21 engine, the SuperTen will handle all the power you can put into it. To set up for the speed, you won't have to do anything as long as you already have a predictable, stable-handling car. I would, however, dial in a little steering expo and use minimal steering servo travel until you've become accustomed to how the car handles at speed. I would say "Have fun," but you obviously don't need me to tell you that!
—Greg

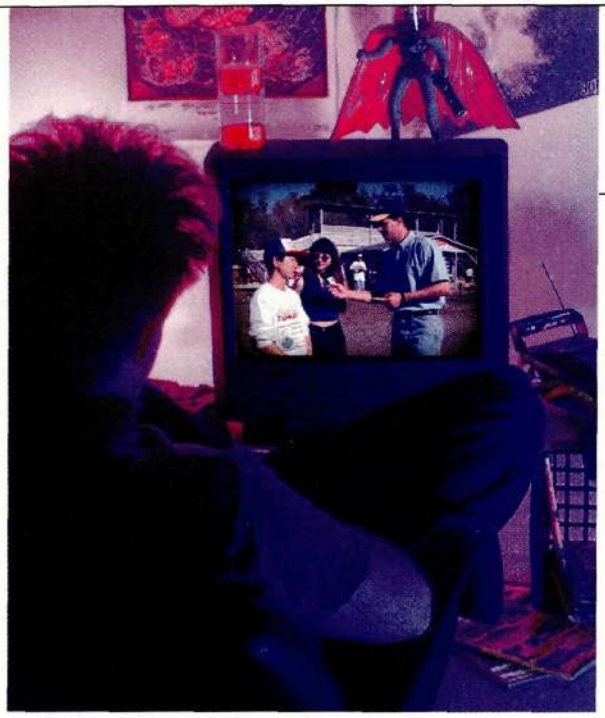
Mr. Big Shot

I want you to know you're the best magazine. I was reading the article about the low rider, and I was thinking about hydraulic lifts. What if you had a stadium truck and had hydraulic lifts, could you hop over the competition? I wonder if there is a rule about this.
VITO MONACO
Glen Cove, NY

First things first, Vito: where can I get my own "Mr. Big Shot" stationery? I often correspond with the big guns of the R/C industry, and I'm sure that some "Mr. Big Shot" letterhead would command me much respect. Anyhoo, I know of no rule prohibiting the use of hydraulic jumping mechanisms in competition. Heck, Speed Racer has had 'em in the Mach 5 since the '60s!
—Pete

Spashett on TRC

Contrary to the previous report in the October edition of "Inside Scoop," David Spashett did not use the new Pro-Line Aeroforce rims to win the 1/12 scale class at the IFMAR World Championships. David used TRC rims and tires exclusively, as noted in the final results chart for the race in this issue's coverage of the event.



BY CHRIS CHIANELLI

Our own show!

Produced by Ambassador Productions, "RC TV" is a 30-minute program dedicated to all aspects of R/C vehicles. The show features cars and trucks, and each episode includes a manufacturers' showcase, technical tips, a builders' corner, R/C news and cool tools. It introduces viewers to experts in the field and provides plenty of action-packed footage. "RC TV" is packed with information that's sure to pique people's interest in the R/C hobby. You'll see detailed, hand-crafted R/C vehicles and world-class driving skills and meet the people behind the wheel. We think this show will further bring R/C into the mainstream, and we applaud its arrival.

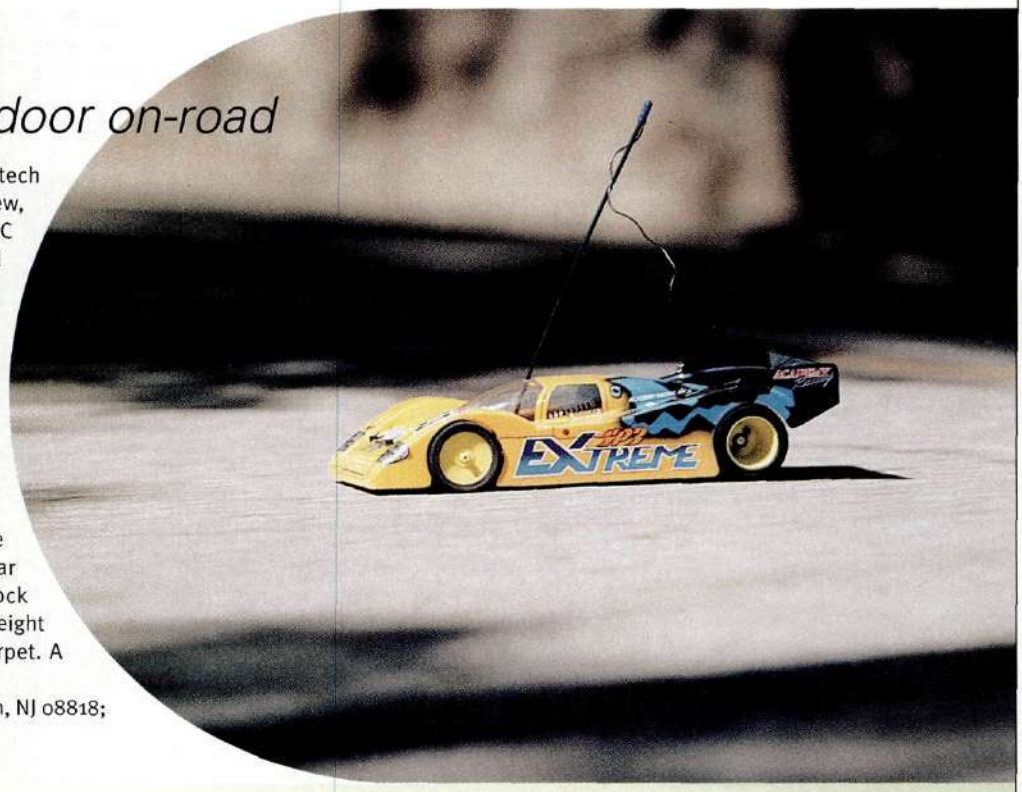
If you would like to see "RC TV" in your area, contact your local public broadcasting station (PBS) and request it. For more information, visit the Ambassador Productions website: www.rctv1.com.

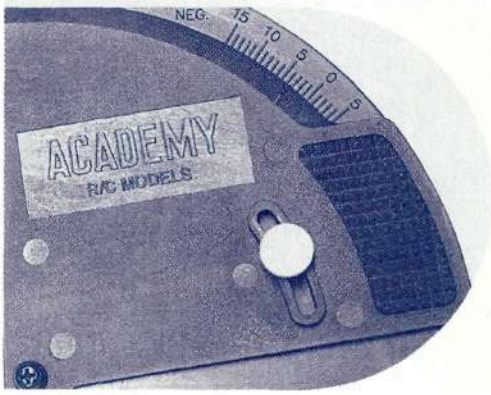
SP3 Extreme

Indoor/outdoor on-road

The new 1/12-scale SP3 Extreme from Altech Marketing is great little car to start a new, inexpensive racing class with your R/C buddies. With its 380-size motor and extremely tight turning radius, the SP3 is excellent for indoor and outdoor tracks on which space is limited. And the best part is that you can start running these races in a very short time because the SP3 is 90-percent factory assembled. Install your radio, paint the body, and go racing. The SP3 comes with a tough polycarbonate body, an RS380 motor and an assembled ball diff. Features include independent front suspension and a rear pod with single, oil-filled, coil-over shock and adjustable camber, caster and ride height that make it tunable to concrete and carpet. A full line of hop-up parts will be offered.

Altech Marketing, P.O. Box 7182, Edison, NJ 08818; (732) 225-6144; fax (732) 225-0091.





Academy ***Camber Gauge***

Also new from Altech is this camber gauge. The unit features: a +5 degrees to -15 degrees scale; composite construction; a 90-degree foot for accurate measurement and a thin edge that easily pushes back the tire's sidewall so readings can be taken correctly—from the wheel, not the tire. The best part is the list price of $7.99.

Altech Marketing, P.O. Box 7182, Edison, NJ 08818; (732) 225-6144; fax (732) 225-0091.

Just for cars! O.S. 4-stroke FS-26S-C

Thought you guys would like this spy shot of the new O.S. .26 4-stroke engine specifically designed for car use. My guess is that it will fit into the Kyosho Super Ten, but please don't hold me to that. This shot is straight from Japan, and I can't even tell you whether it will ever be available here in the USA, so don't go calling Tower Hobbies about it. Having said that, however, I do feel my loyal readers have the right to know of its existence.

O.S.; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826; (217) 398-6300.

RACING ELECTRONICS FROM LRP

WORLDS IFMAR SCOOP

LRP released its new Quantum ESC, shown here in prototype form. Don't let the shrink-wrapped case fool you; this is one very serious ESC that will end up as LRP's flagship model. We can't tell you too much at this time because it's still a very hush-hush project. We can tell you that this new speedo helped Team Trinity driver David Spashett win the 1/12- and 1/10-scale IFMAR World Championships, and David also used the Quantum in his Losi Street Weapon to capture the overall ISTC World Cup Championship. As soon as we get more information on the LRP Quantum ESC, we'll pass it on to you.

LRP also released a new FM receiver—the Phaser—that should be available by the time you read this. With only two channels (steering and throttle), it's very compact and features special interference-suppression circuitry that filters out "noise" from the motor and other devices. This new unit should be very popular with racers who prefer to "match" their electronics, and it is compatible with all the major transmitter brands, including Futaba, Airtronics, KO Propo and JR.

LRP, Wilhelm-Enssle-Str. 134, 7064 Remshalden, Germany.

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Team Orion's new Orbital line of motors is perfect for those who seek maximum performance but require ease of installation and budget prices. These machine-wound motors include installed capacitors and Tamiya-style bullet connectors. The motors are available in various winds and both fixed-endbell/bushing and adjustable timing/bearing versions.

The Orbital Stock 27 is a ROAR-legal, 27-degree stock motor that comes with capacitors fitted and special Orion brushes installed. Each is dyno-tuned and comes with the result sheets. It's a perfect choice for competitive stock-class racing.

Team Orion's Modifieds, including the new Super Touring motors, are pattern-wound and epoxy-balanced for the utmost in performance. They were designed for many types of racing, as evidenced by the huge selection of available winds. Team Orion Modifieds and Super Touring motors were designed and developed by Darren Westman for the USA and Oscar Jansen for Europe and Asia.

Team Orion; distributed by HPI, 15321 Barranca Pky., Irvine, CA 92618; (714) 753-1099; fax (714) 753-1098.

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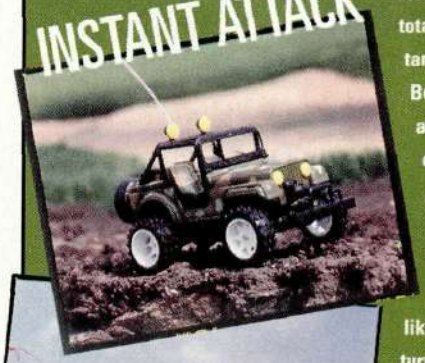
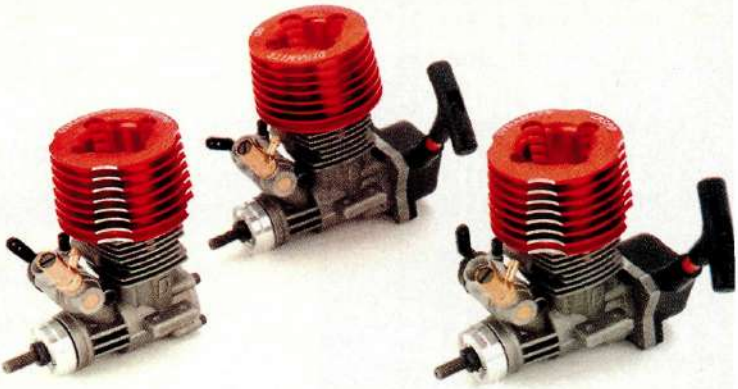
NEWS FLASH

INSTANT ATTACK



Here's a quick look at two totally fun, ready-to-run military vehicles from Hobbico. Both the Abrams M1 Tank and the Power Patrol Jeep come fully assembled with a 2-channel radio installed, and they use standard 7.2V flat packs. The tank does full-scale-like, standing, 360-degree turns, and the Jeep pops wheelies when the throttle is punched. Stay tuned for more.

Hobbico/Great Planes Models Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-3630; fax (217) 398-0008.



Fresh Dynamite

More explosive

The Dynamite line has been totally redesigned. The new engines, which include the 12S and 12S PD (Paris dished), feature: true, chrome, ABC, double-taper piston and sleeve technology; full three-port port induction; twin-needle carburetor; and, of course, a dual ball-bearing-supported crankshaft. Horizon Hobby Distributors, claims the 12S has a very smooth power band for excellent drivability and response in the turns. Stay tuned for more on this one.

Dynamite; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511; fax (217) 352-0355; www.horizonhobby.com.

Two heads are better than one

Trinity's new Team Kinwald Dual Wrench is just the ticket for speedy motor changes. Use the 0.050-inch end to loosen the pinion setscrew, then flip the wrench over to yank out the motor screws with the 2.5mm end. The blue-anodized handle makes the wrench easy to spot, and the precision-ground tips fit precisely for strip-free wrenchin'.

Trinity Products Inc., 36 Meridian Rd., Edison, NJ 08820; (732) 635-1600; fax (732) 635-1640; website: wwwteamtrinity.com.

Kyosho Moon Eyes

The Moon Eyes Street Van joins Kyosho's 1/10-scale nitro-powered QRC (Quick Reverse Clutch) line. Moon Eyes shares the engineering design of Kyosho's QRC series and features a pull-start GS-11X engine and the revolutionary Quick Reverse Clutch that lets modelers slam into reverse using conventional 2-channel control. Moon Eye features include: rugged, 2mm aluminum chassis; enclosed receiver and battery compartment (to keep out dust and dirt); 4-wheel independent double-wishbone suspension; oil-filled shocks and impact-resistant polycarbonate body with Moon Eyes decals set. The QRC unit comes assembled and it, too, is completely enclosed to protect it from dirt and damage.

Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-9021; (217) 398-6300.

READERS' rides

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 100 East Ridge, Ridgefield, CT 06877-4606 USA. If we choose to feature your creation, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the eighth annual "Readers' Rides of the Year Contest" in the fall of 1998. In case we need to contact you, write your address and phone number on your letter and on the back of every photo you send. Good luck!

Helluva Hummer

If anybody out there has a sign that reads "Beware of radio control car," it must be Kenneth Lyssy of Stockdale, TX. With the exception of the Tamiya Hummer body, Kyosho Double Dare gearboxes, wheels, and tires, and DuraTrax shocks, Kenneth hand-built every part of this military monster himself (during visits home from the asylum, one assumes). From his Futaba Conquest 6-channel radio, Kenneth can not only drive the vehicle, but also raise, lower and fire the rocket, open the cargo bay and activate a RAm 3-way siren—hopefully, before launching the rocket. Kenneth designed a dual-servo steering system to keep the vehicle pointed in the right direction, added eight DuraTrax competition shocks to suspend it and keeps it moving with a Novak 610HRV ESC.

Bullheaded

Randy Yanos sent his "Reader's Ride" all the way from Waipahu, HI, and it's a winner. His high-ridin' Tamiya Bullhead sports a custom lift job, lots of chromed parts, working headlights, Trinity Monster Mash motors, dual-servo steering and a couple of fully dressed Parma Hemis sitting in the bed. Randy says the rig took second place at a custom car show that featured an R/C vehicle class. The first-place finisher must have paid off a judge.

Web Slinger

Rawley Macias of Newhall, CA, races with his cousin Andy at Hot Rod hobbies in Saugus, CA. It's hard to miss Rawley's perfect web-with-fade Dahm's Toyminator body, and there's plenty of good stuff "under the hood" to go with the spidey-shell, including an Integy RC1700 matched pack, Trinity Onyx motor, Futaba Magnum Junior radio and Lunsford titanium turnbuckles.

Every Hop-Up!

This far-from-stock Tamiya F-103 belongs to Bill Eyre of Everett, WA. Bill airbrushed the body himself, and he says the car is equipped with every Tamiya hop-up part available, but uses the kit motor; Bill uses the stock silver-can powerplant to keep the car legal for Tamiya Championship Series competition. A Novak Tempest MAX ESC motivates the car, and a Futaba Magnum Sport radio commands it.

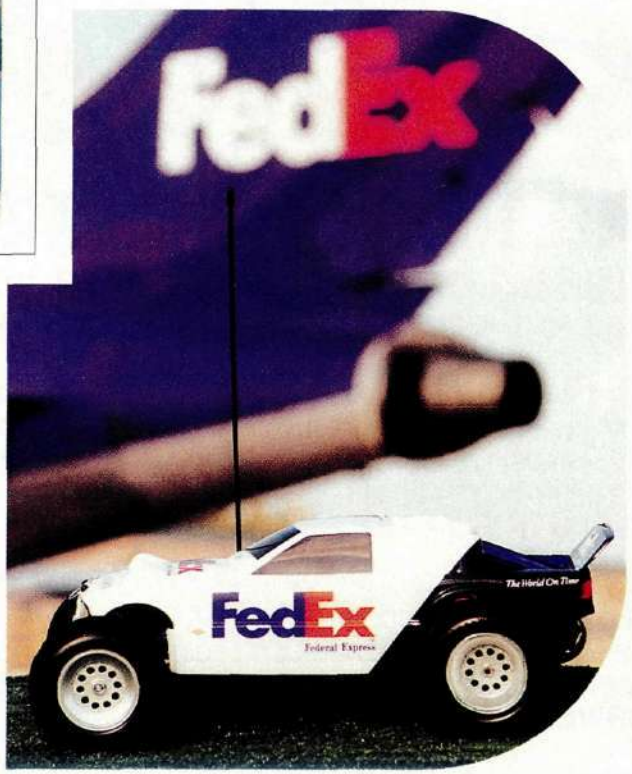
Big Rig

Whoa—you don't see one of these every day. Able (that's it, just Able) of San Francisco (note the bridge) sent us this great shot of his 1/5-scale FG Modellsports rig. Too cool! Check out all the detail Able has added to the body; wipers, exhaust stack, grab rails, chains ... everything.

Able says the truck has a functional horn, siren and 4-disk brake, and it's controlled via a Futaba 4-channel stick radio.

Dual Sport Street Rod

Tractor-trailer driver by day, R/C hot-rodder by night; Larry Brothers has created the wildest Associated Dual Sport we've ever seen. Larry made the bumpers for the '32 Bolink Coupe body himself, added headlights and taillights and bolted in some serious power; there's a Peak 10-turn motor, HPI 2-speed tranny and Tekin 410 ESC under there! A Parma Hemi engine gives Larry's creation the look of a real speed demon. If you're near Tazewell, TN, look for Larry in his rig or tearing up a parking lot with his street rod.



Overnight Success

"Radical" Rich Pierce of Maplewood, MO, a vehicle mechanic for FedEx, displays corporate pride with his beautifully finished Team Losi XX-T 'CR' Graphite Plus. Rich outfitted his truck with a Protoform Nevada XXT body, RPM Torkerz wheels, Trinity Midnight 2 motor and matched 2000 cells, and a Novak T-1 ESC. Rich uses a Futaba 3PDF radio to keep everything under control.

Ain't Love Grand?

Tony Weaver says his girlfriend, Linda, shares his enthusiasm for R/C and has her own Tamiya Blitzer Beetle to run with his Traxxas Stampede way out in Waldport, OR. Linda's Beetle features Maxtec power, Pro-Line Speed Hawg tires, bearings, and Airtronics radio gear. Tony hopped up his Stampede with a Novak Super Rooster ESC, Trinity Ruby motor, MIP CVDs and a slipper clutch. Tony also chooses Airtronics gear to control his truck. Lookin' good!

sponsored by MAXTEC
HIGH PERFORMANCE RACING PRODUCTS

PIT tips

workshop ideas & innovations

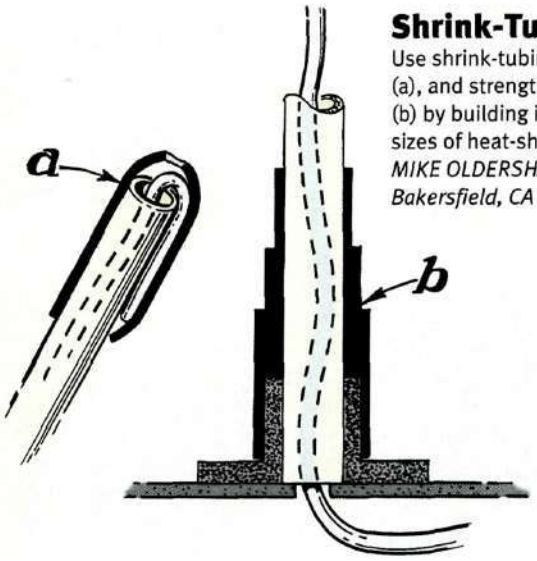
BY JIM NEWMAN

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.

Shrink-Tubing Tips

Use shrink-tubing to secure antenna wire (a), and strengthen the antenna tube mount (b) by building it up in layers with various sizes of heat-shrink tubing.

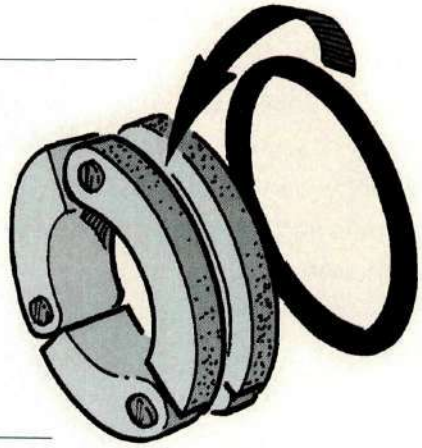
MIKE OLDERSHAW
Bakersfield, CA



O-Ring Clutch Spring

Many sizes of rubber O-rings can be found in the plumbing department of your local hardware store. Place one in the groove around the clutch, as shown, and use various sizes to alter the rpm at which the clutch engages.

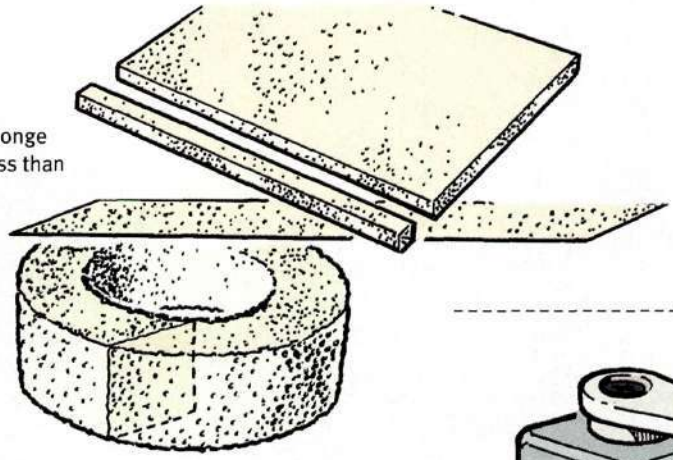
CLAUSS RADDATZ
Canton, MI



Thrifty Foam

To make your own foam tire inserts, purchase 1-inch (25mm) sponge foam from a fabric store (it costs less than $2!). Cut the foam into strips, then glue the ends together. A large number of foam inserts can be made very inexpensively. To avoid hard spots in the inserts, use rubber cement and an angled cut for joining.

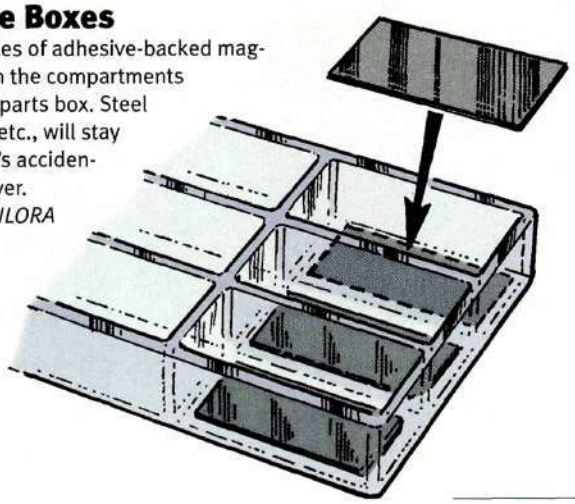
MIKE KARWATH
Erlanger, KY

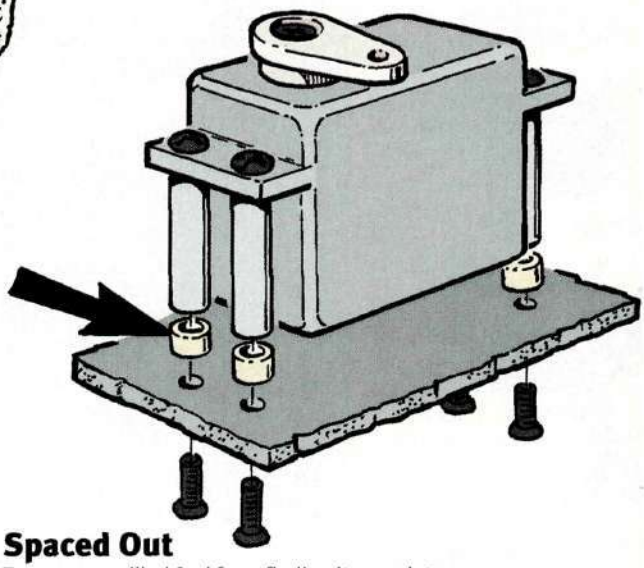


Attractive Boxes

Place rectangles of adhesive-backed magnet material in the compartments of your spare-parts box. Steel screws, nuts, etc., will stay in the box if it's accidentally turned over.

OCTAVIO AGUILORA
El Paso, TX





Spaced Out

To prevent spilled fuel from finding its way into your servos, use 1/8-inch (3mm) plastic tube spacers (shown arrowed) to raise your servos up off the chassis and above any spilled fuel.

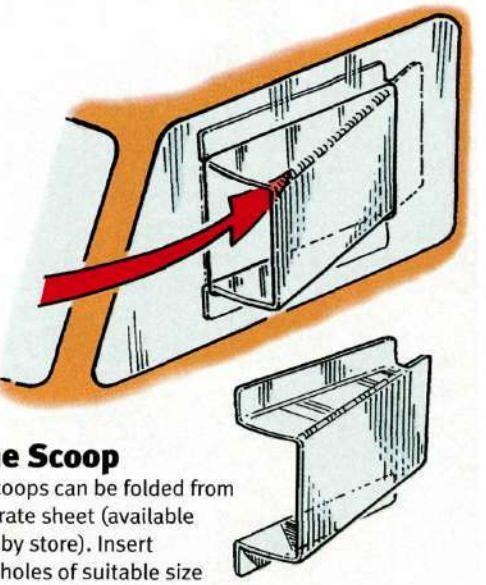
CRAIG HECK
Cottonwood, AZ

sponsored by MAXTEC DEVELOPEMENT

Dotty Chassis

Stick self-adhesive paper dots over each screw head to keep out mud. The dots are easily peeled off for maintenance work.

FRASER McMILLAN
Dundonald, Ayrshire, Scotland



Get The Scoop

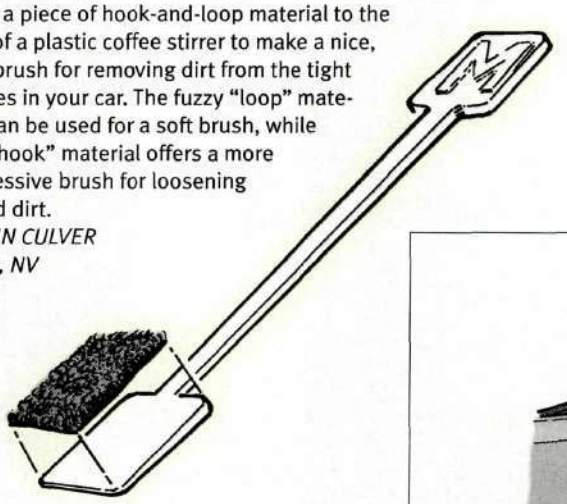
Cooling scoops can be folded from clear butyrate sheet (available at the hobby store). Insert them into holes of suitable size that you've cut in the side windows of your body shell, then secure them with a drop of thin CA glue.

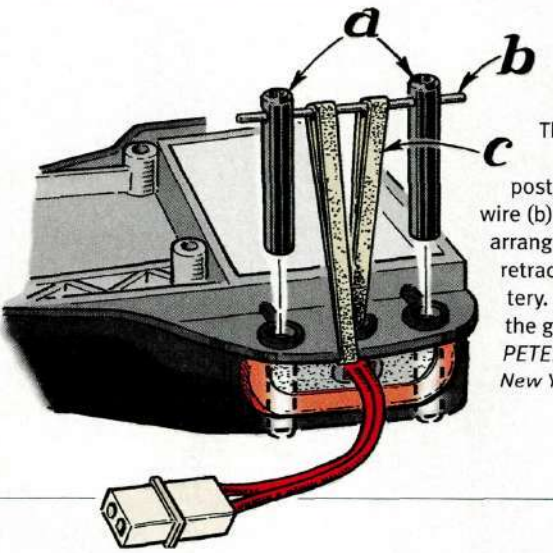
AARON HINES
Boone, NC

Mac Attack

Stick a piece of hook-and-loop material to the end of a plastic coffee stirrer to make a nice, thin brush for removing dirt from the tight spaces in your car. The fuzzy "loop" material can be used for a soft brush, while the "hook" material offers a more aggressive brush for loosening caked dirt.

JUSTIN CULVER
Reno, NV

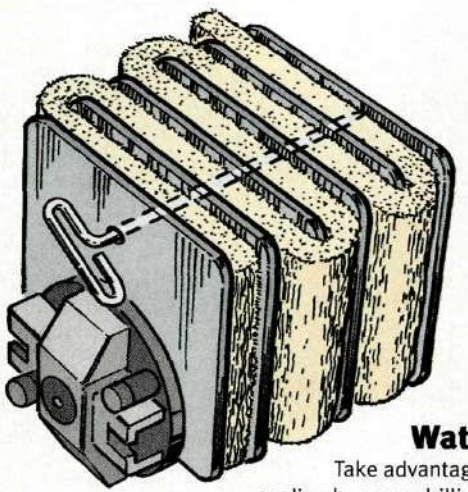




Battery Gate

This works well on Tamiya tub chassis. Two 30mm body posts (a) joined with a tight-fitting wire (b) and a rubber band (c) are arranged as shown, and they form a retractable gate to hold in the battery. To change the battery, just lift the gate and slide out the pack.

PETER CHAN
New York, NY



Water-Cooled

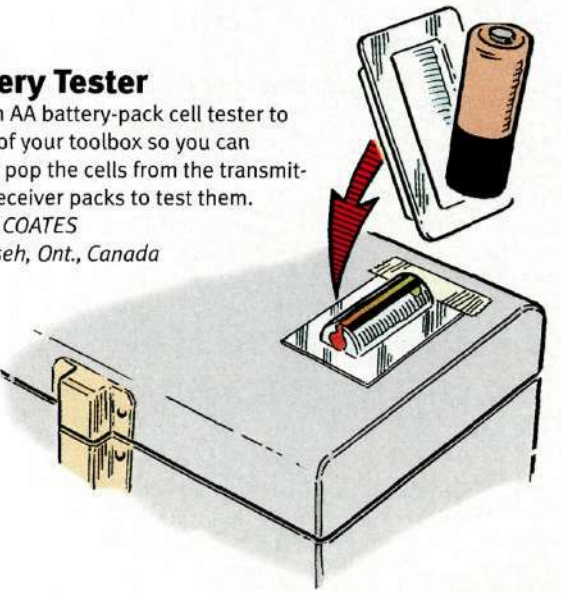
Take advantage of evaporative cooling by cross-drilling a motor heat sink and placing a wet chamois between the fins. Insert a T-pin to hold the chamois in place. For maximum cooling, Mike recommends a 50/50 solution of rubbing alcohol and water.

MIKE ROMMEL
Prince George, B.C., Canada

Battery Tester

Tape an AA battery-pack cell tester to the lid of your toolbox so you can quickly pop the cells from the transmitter or receiver packs to test them.

GLENN COATES
Tecumseh, Ont., Canada



TROUBLE shooting

your r/c problems solved

BY DOUG MERTES • ILLUSTRATIONS BY JIM NEWMAN

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at *Radio Control Car Action*, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

Headed for Diff-Aster ?

I race an older RC10 buggy with the Stealth transmission in the stock class at my local track. I do pretty well, but the differential doesn't feel as smooth as it used to. My car is almost five years old, and I've never opened the transmission, but I wonder if I should even worry about it. What do you think? I'm also curious about different buggy bodies. Are any of them considered faster than others? [email]
BUGGYBOY

You know, it never ceases to amaze me how long a well-designed, off-road vehicle will last! Your RC10 is going on five years old, yet it sounds as though it's still going strong. I see lots of older Losi, Kyosho and Associated trucks and buggies at the local track when I go out to race; 10 years ago, we were happy if our cars and trucks made it through an entire season without falling apart!

Smooth differential action is important to off-road vehicles for consistent handling, but it's not as critical as it is for on-road cars and sedans. If things aren't too gritty, I would just leave it alone. On the other hand, if it feels kind of sandy in there, it's a simple matter to replace some of the transmission's internal components. Even if you decided to do a first-class rebuild, the full retail price would be only about $24 (the parts numbers for everything you would need for a complete rebuild are listed below). Just take your time, follow the instructions and clean the bearings and the other parts that you'll re-use. The list may look long, but it shouldn't take more than a careful hour to complete the job.

As far as buggy bodies are concerned, I don't think there is any kind of performance advantage. On the other hand, if you're just looking for something a little different, several companies (Protoform, Parma, Dahm's and others) make buggy bodies that will fit your car and set you apart from the crowd a bit.

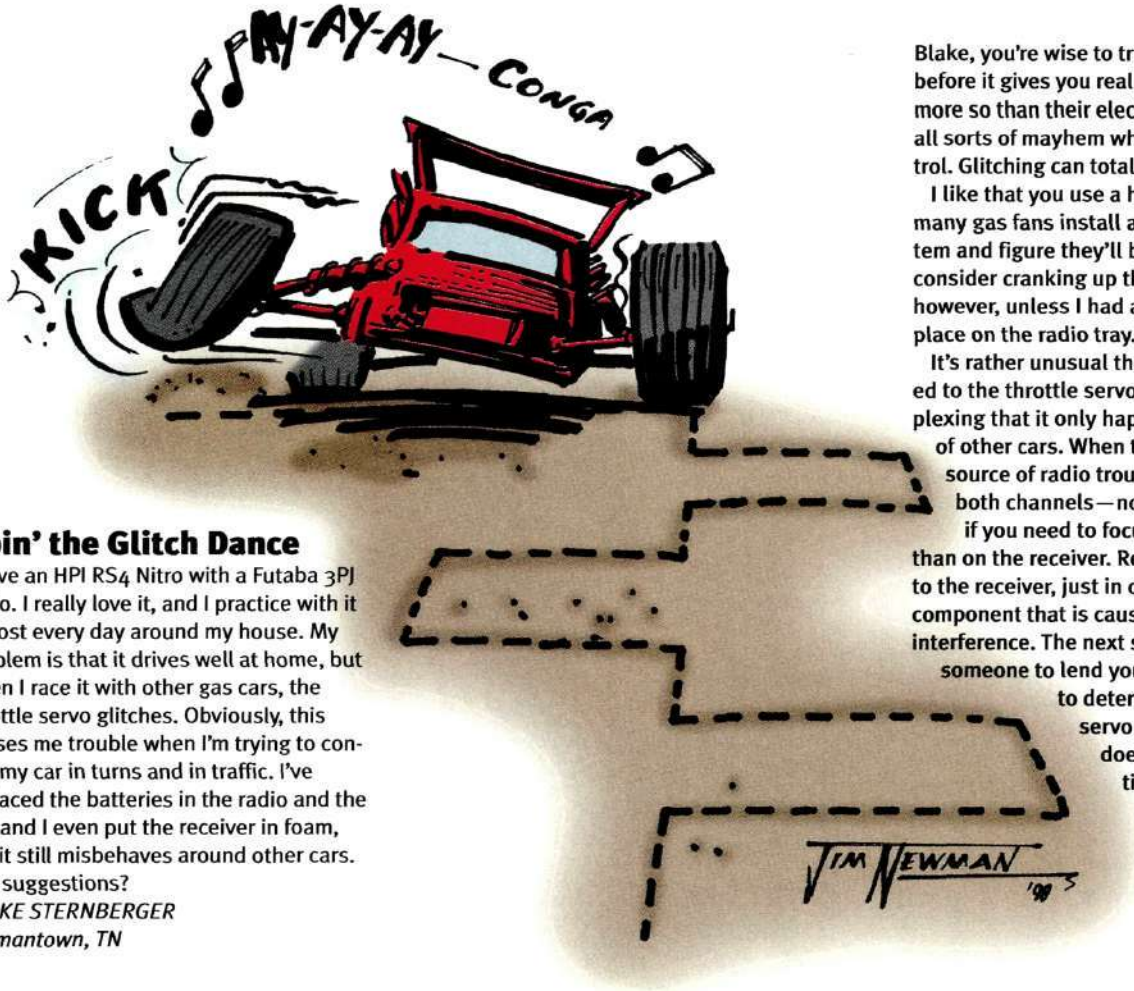
PARTS REQUIRED
- Felt gasket— part no. 6566
- Diff thrust washers—6573
- Diff thrust balls—6574
- Miscellaneous hardware for thrust bearing—6575
- Diff rings—6579
- Carbide diff balls—6581
- Diff thrust spring—6582

Clicky Hummer

I have a Tamiya Hummer. Whenever I drive it, the gearboxes make a clicking noise. I'm not sure if the gears are getting chewed up, or if they're just too tight. What do you think?
ROBERT ZIELINSKI
Farmington Hills, MI

Robert, one of the neat things about the Hummer is that it's based on the TA-01 and TA-02 series chassis. That means that it's simple and ultra-reliable, and if you follow the diagram in the instruction manual, it's pretty hard to mess up the gear mesh. Start by consulting the manual and make sure that you have the motor screws in the correct holes for the pinion and spur gears that are installed in the gearbox. If they're correct, make sure that the pinion isn't grinding away at the interior gearbox wall. You can also check this visually by taking off the upper gearbox hatch to see whether the pinion is hitting the gear case when the motor is installed.

If everything looks OK there, pull the diffs out (they're easily accessible by removing a few screws), and see if a small stone or a plastic particle has fouled the gears. Even a teeny piece of grit can cause a lot of noise.



Doin' the Glitch Dance

I have an HPI RS4 Nitro with a Futaba 3PJ radio. I really love it, and I practice with it almost every day around my house. My problem is that it drives well at home, but when I race it with other gas cars, the throttle servo glitches. Obviously, this causes me trouble when I'm trying to control my car in turns and in traffic. I've replaced the batteries in the radio and the car, and I even put the receiver in foam, but it still misbehaves around other cars. Any suggestions?

BLAKE STERNBERGER
Germantown, TN

Blake, you're wise to try to fix this problem before it gives you real headaches! Gas cars, more so than their electric brethren, can cause all sorts of mayhem when they get out of control. Glitching can totally ruin your day!

I like that you use a high-quality radio; too many gas fans install an inexpensive AM system and figure they'll be OK. I wouldn't even consider cranking up the old nitro breather, however, unless I had an FM or PCM radio in place on the radio tray.

It's rather unusual that the problem is limited to the throttle servo and even more perplexing that it only happens in the presence of other cars. When the receiver is the source of radio trouble, it usually affects both channels—not just one. It sounds as if you need to focus on the servo rather than on the receiver. Re-route the servo lead to the receiver, just in case it's too close to a component that is causing or amplifying interference. The next step would be to ask someone to lend you a servo so you can try to determine whether your servo is the problem. If that doesn't cure it, then it's time to send your radio system in to the manufacturer to check it for proper tuning.

No Problem!

I recently bought a Tamiya Chevy S-10 truck. I got it assembled pretty quickly, and it's a lot of fun to drive around. After a while, however, I noticed that when the wheels are turned all the way to the right, the right wheel is turned slightly farther than the left one. When the wheels are turned all the way to the left, the left one is turned farther than the right. What's the matter with my truck?

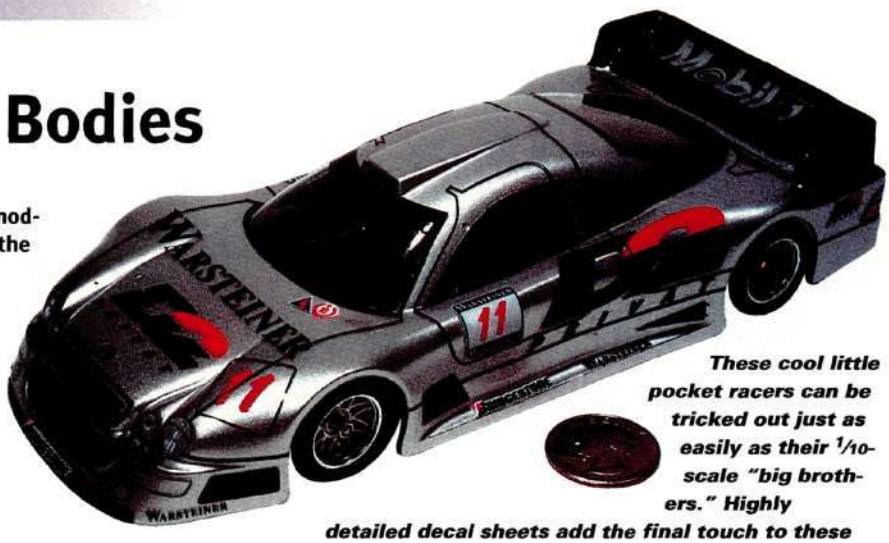
BRANDON TIBBITTS
Grace, ID

Brandon, there's nothing wrong with your truck! What you're describing is called "Ackerman," and it's the result of the suspension and steering-linkage geometry. The technical explanation can get rather confusing, but what you see as a problem is actually done intentionally to help your truck handle better. As you noticed, the front wheel on the inside of the turn, whether right or left, is always more angled than the wheel on the outside. If you visualize the car from above as it drives around a circle, the reason the front end is designed to do this becomes apparent. Let's say your truck is 1 foot wide, and you're driving it in a circle that's 4 feet in diameter. The wheels on the outside are traveling around the full circumference of the 4-foot circle, but since the truck is 1 foot wide, the inside wheels are going around a 3-foot circle. Now it makes sense; the inside front wheel must turn more tightly because it needs to follow a "sharper" turn. This is an extreme example, but you get the idea. ■

BY KEVIN MEYER

Detailing 1/24-scale Bodies

If you're like me, you probably built quite a few static models before you graduated to the world of R/C. Though the appeal of radio control is undeniable, large, 1/10-scale cars are less "shelf-able" than smaller, "display-only" cars. Kawada USA's* Tripmate M-24 chassis and bodies allow full R/C control in a small, 1/24-scale package, and they're a great way to combine convenient size with real driving fun. Instead of just slipping the car into a display case, I can cruise it around the living room!



These cool little pocket racers can be tricked out just as easily as their 1/10-scale "big brothers." Highly detailed decal sheets add the final touch to these mini-machines. Hood and door lines are made by cutting 1/64-inch stripes of Pactra's pinstripe tape. The grill work and headlights were cut from the JK Products Mercedes decal set. Wiper blades from a Detail Masters* kit (part no. DM2003) were added to the windshield. Black them out with a permanent-ink pen, or color-code them to match your paint job.

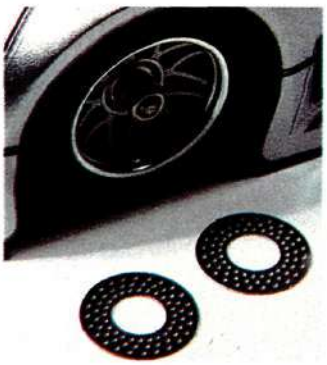
BODY BEAUTIFUL

My attention was directed to Kawada's new Mercedes-Benz CLK GTR body (part no. TM-63), which includes a snappy-looking decal sheet to help complete the package. Other extras include trim lines to help obtain a precisely trimmed body and a plastic film covering to protect the body from overspray.

The decal sheet has great-looking graphics, and the blackout window decals can be applied to the inside of the body to mask off the window area. (You could also just spray the body without masking it and apply the window decals to the outside of the shell.) I chose to mask off the windows and use Pactra's* pinstripe tape to complete the window molding. I sprayed the inside of the shell with three coats of Pactra's Indy Silver and finished with two coats of Sprint White to bring out the metal-flake and make the finish opaque. The tiny body requires minimal paint; I didn't even use an entire can of either color.

DIVINE INTERVENTION

When I set out to find "Warsteiner" sponsor decals for the CLK, I looked for 1/24-scale static model kits. At last, I found a Mercedes-Benz CLK kit by Tamiya in the correct scale, but the model cost almost $30. Since I only wanted to swipe the decal sheet, I decided that was too steep. On my drive home, I decided to cruise by "Fastlane," the local slot-car shop. When I entered the store, the first thing I saw on the wall was a set of JK Products* "Warsteiner-D2" decals (part no. JK210ST) for the Mercedes!



You've seen it done in 1/10 scale; why not try it in 1/24? Mini disk-brake rotors add a new dimension to the suspension area. The 1/24-scale brake disks are in a scale-parts kit from Detail Masters (DM2231). To darken the surface and give the disks some "wear," sand them with 600-grit sandpaper, or apply some flat black paint and then sand lightly around the edges to simulate brake dust. Chrome-plated hoops (TM-04P) add a bright look to this car.

With a red/black paint scheme and a little imagination, I created my own "Calsonic" theme car. The JK Products decals (JK2106ST) were designed originally for the Nissan GTR body. It was easy to create my fictional race team; all I did was trim the stickers a bit to revitalize my Nissan Skyline body (TM-61). For a custom touch, I highlighted this paint scheme with color-coordinated rims; I painted the white stock rims red to match the body. I find that Testors* enamel model paint is durable and works quite well for this type of application.

This company has its roots in slot cars, so it's dialed in to small-scale bodies. It has several graphics sheets that are the perfect size for the M-24 project car. The vinyl material is of high quality and stretches smoothly around all body contours with no problem. Even when removed and reapplied, the stickers adhered flawlessly to the body; the JK decals—combined with those supplied by Kawada—were exactly what I needed to complement the M-24's compact size.

WRAPPING IT UP

Working on these micro machines really brought back memories of building dozens of static-display models. Now I can actually drive those cars because the bodies fit the M-24 chassis! The Tripmate bodies are easy and fun to work with. Check at your local hobby store or slot-car shop, and you'll find nearly limitless scale accessory parts. And—as always—have fun.

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

BY DOUG MERTES

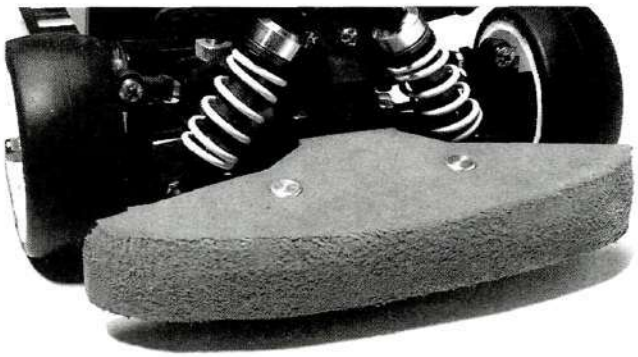
Save your sedan: install a foam bumper!

Over the years, I've driven a lot of sedans. They all differed from one another, but they all used Lexan body shells that eventually split or wore out. At first, I thought it was my driving skills—or the lack thereof—that led to the progression of polycarbonate trashing as my season progressed. But when my driving skills improved, I still found myself replacing expensive bodies. I hate to spend money, so I set out to find some way to preserve my investment and keep my touring car looking good.

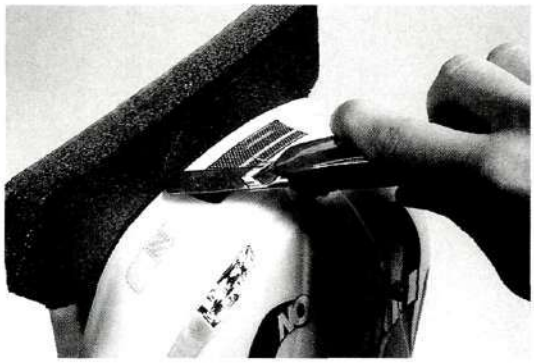
This body has had it! Cracked wheel wells and shattered lower lip indicate that this fella has spent too much time on the boards.

I spent a lot of time looking at sedan bodies in the pits, and I even dug through a few garbage cans to take bodies that other racers had thrown away at the end of the day. I didn't bother with the super-skilled folks who never hit anything because their bodies never really deteriorate; they just die of old age! Nope; I concentrated on the shells from the wall-bangers, corner-dot smackers and elbows-out types who make up most of the field at any given local club race. You know—us!

Most sedan bodies suffer the most damage in two places: the front wheel wells and the front end. Almost every body I got my hands on had cracks that ran from the center of the front wheel wells up into the hood area, and the really nasty ones had several on each side. Many of the bodies I saw had front ends that required more support than is provided by two body posts. This lack of support allowed the lower lip to droop or bounce on the pavement when the car hit a bump, and this eventually led to fatigue and cracking.



Many upscale chassis come with some sort of foam bumper to protect the body and chassis.



Hold the bumper up to the body and score it with a hobby blade. Finish the cut on a flat surface.

FRONT FOAMIES

The best solution to the problem at hand is a high-density, closed-cell foam front bumper. Many chassis kits now come with one in a "one size fits all" shape, or you can pick one up separately at a hobby shop. I like the super stiff ones made by T.D. Enterprises*, but TRC*, Trinity*, Yokomo* and several other manufacturers also make good universal bumpers.

Properly mounted and spaced, a good foam bumper will support the front end, help the body retain its shape after a particularly nasty accident and prevent it from dragging on the ground, even when the parking lot is ultra-bumpy.

When a bumper is properly formed to the front of the body, it helps protect it from damage. The problem is that not all touring-car chassis readily accept a foam bumper. While lamenting over a pile of junkyard-bound bodies, I came up with an alternative way to mount a foam bumper on these troublesome vehicles. The bumper isn't mounted on the chassis at all; it's mounted on the body! I mount a bumper on each body so that the fit is perfect and the protection is enhanced.

First, I check the internal clearance between the front of the chassis and the inside of the body (without the foam bumper), to see how much area I have to work with. I always start with a bumper that's larger than required to ensure that it will fill the gap between the chassis and the body completely.

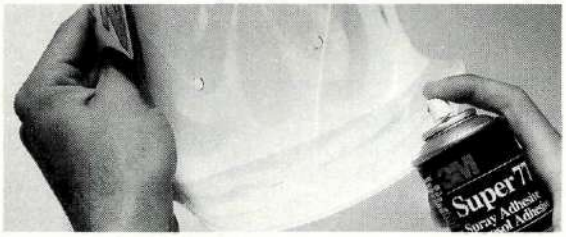
Next, I fit the front edge of the bumper to the inside of the body as closely as possible. It really pays to take your time here because a bumper that's really formfitting will prevent the front end and grill area from collapsing when you take a full frontal impact. Use a very sharp X-Acto blade (be careful!) to cut the foam to size—just slightly larger than you'd like it to be. Then smooth its corners and take the dimensions down to the desired size with a rasp or a sanding drum mounted on a rotary grinder, such as a Dremel* tool. It's best to do this outside because it's messy, but if you do it properly you'll wind up with a nicely finished bumper. Work slowly and take your time because you can take foam off but you can't put it back on!

Contour the bumper foam to fit the inside of the body.

AND THEN ...

Once you have fitted the bumper to the body, put the body on the chassis and fit the rear of the bumper to the chassis. You'll be attaching the foam to the body, so you can afford to move the front body mounts back as far as they'll go for more hood support. I like to run the bumper all the way back up against the front gearbox or bulkhead if possible. On the older Yokomo YR-4 models, the bumper goes against the front bulkhead, and I dispensed with the original plastic front bumper altogether. Tamiya TA02 cars have a small front bumper that's an ideally situated backstop for the foam bumper, and even FF and TA03 chassis offer plenty of support from the motor-pod assembly. In any case, make sure that the bumper won't interfere with the drive belts, and check that there's sufficient room for the front wheels to turn from lock to lock without hitting the bumper.

To attach the bumper to the painted body, apply a layer of wide, high-quality masking tape to the inside of the front end. I usually cut the tape into ½-inch-wide pieces so that I can follow the body's contours as closely as possible. The masking tape protects the paint job; adhesives that are brushed directly onto the paint will make it bubble and won't really hold the bumper very well. Put a layer of contact cement on the tape and the foam where they'll mate, and allow it to dry for 15 minutes. Use a lot of contact cement because it will soak into the foam. When the first layer of cement has set, spread another one, let it dry for 15 minutes and then press the foam into place. Allow it to cure overnight, and you should be ready to go.



Place a layer of masking tape on the inside of the body to protect your paint job. A couple of coats of spray adhesive will hold the bumper to the body.

This body should last long enough to justify the time and effort you put into painting it!

HOOD SUPPORT

Another way to increase support is to brace the area under the windshield and across the hood with a second layer of Lexan. If you always use the same body style and manufacturer, you could cut a piece from the hood of a worn-out body for this. I fashioned a strengthening second layer from some flat, light Lexan sheet available from Bolink*, and it did a pretty good job of supporting the hood and front end. Because I taped it onto the underside of the hood with super-sticky duct tape, my body shell didn't look any different from before, but it sure did last longer!

THE RESULTS

While these techniques won't make you a better driver or improve the quality of your paint jobs, it will give you a better chance to finish any race you start. Too often, I see guys pulling their cars out of a race because their bodies are dragging on the ground or rubbing on a tire. Properly installed, the foam front bumper can make the difference between having to buy and paint half a dozen bodies during the course of the parking-lot season and being able to spend that money on go-fast options such as motors and tires.

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

Roland

graphic jam.

If you want to add traffic-stopping graphics to your RC cars, check out the STIKA design cutter from Roland. It's small enough to sit on your desktop and powerful enough to create detailed logos, vinyl lettering, custom airbrush stencils, and more. Available in 8" and 12" wide models, STIKA connects to your PC or Macintosh* and provides everything you need to create high-impact graphics, including a lettering and graphics program. Vinyl is available in a wide assortment of colors. Call toll-free or visit our Web site for more information.

* With optional SignMate STIKA Software

Cars designed by:
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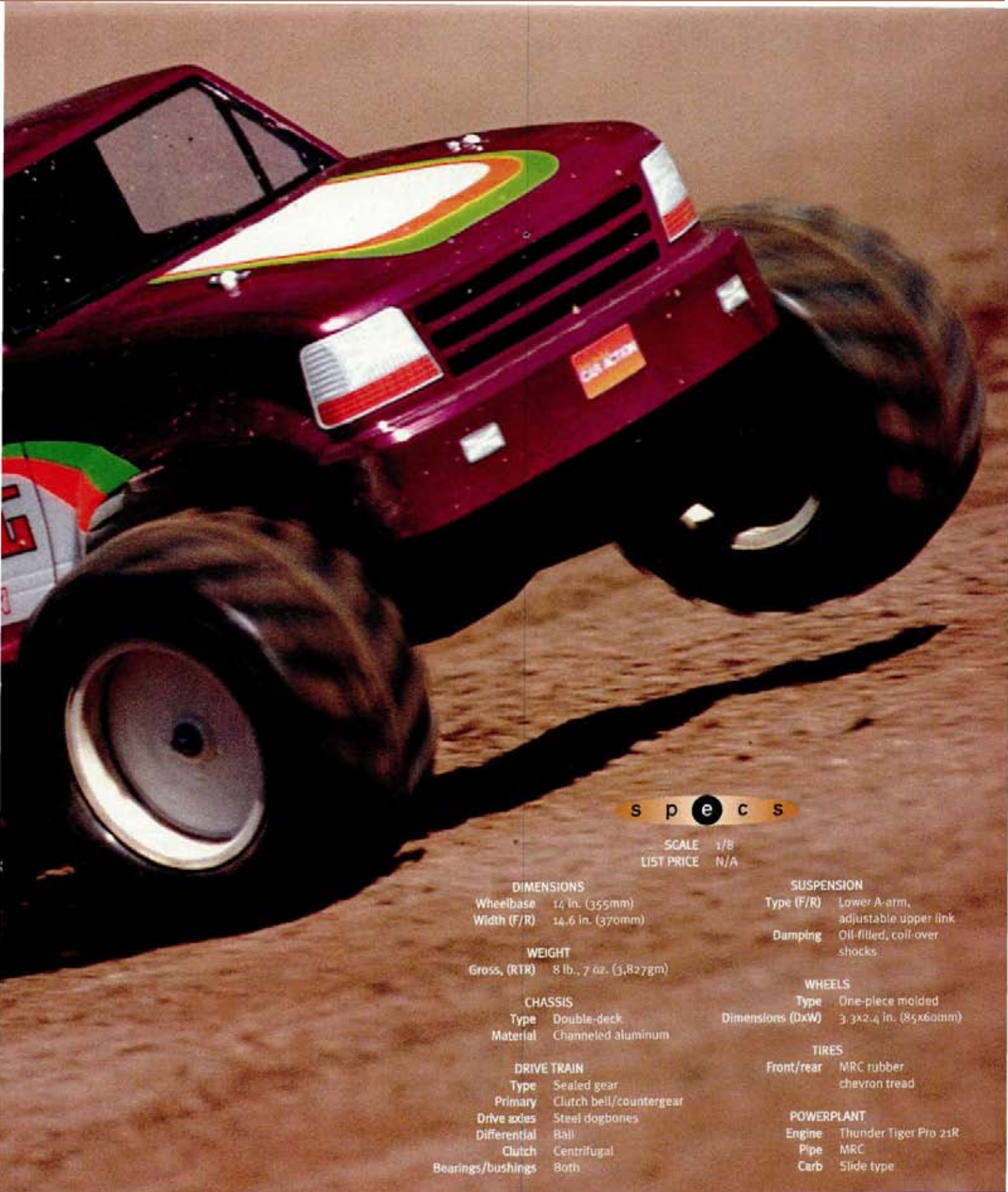
thrash TEST
1/8 scale gas

MRC Nitro Thunder King

by Peter Vieira

If ever a truck was born to be nitro-powered, it's the MRC Thunder King. While certainly fun to knock around with under electric power, the King's massive size, plush suspension and generous ground clearance cry out for all the ponies a .21 engine can muster. Happily, MRC heard the call and has (finally) gotten the Nitro Thunder King out the door and onto hobby shop shelves, complete with a Thunder Tiger* Pro 21R engine. I would have been happy enough if the gang at MRC had simply dropped in nitro power and left the truck alone, but they went over the top on this one. Performance wasn't enough, the Nitro Thunder King had to be convenient as well—even beginner friendly. Beginner-friendly .21 power? There's a new concept! Let's see if MRC pulled it off.*

GAS G



OLIATH

PHOTOS BY WALTER SIDAS

specs

SCALE 1/8
LIST PRICE N/A

DIMENSIONS
Wheelbase 14 in. (355mm)
Width (F/R) 14.6 in. (370mm)

WEIGHT
Gross, (RTR) 8 lb., 7 oz. (3,827gm)

CHASSIS
Type Double-deck
Material Channeled aluminum

DRIVE TRAIN
Type Sealed gear
Primary Clutch bell/countergear
Drive axles Steel dogbones
Differential Ball
Clutch Centrifugal
Bearings/bushings Both

SUSPENSION
Type (F/R) Lower A-arm, adjustable upper link
Damping Oil-filled, coil-over shocks

WHEELS
Type One-piece molded
Dimensions (DxW) 3.3x2.4 in. (85x60mm)

TIRES
Front/rear MRC rubber chevron tread

POWERPLANT
Engine Thunder Tiger Pro 21R
Pipe MRC
Carb Slide type

MRC NITRO THUNDER KING

TEST GEAR • Futaba Magnum Sport transmitter and receiver • Futaba S3003 servos • Thunder Tiger Pro 21R engine • Byron 20-percent-nitro Race Fuel

PERFORMANCE

Assistant editor Greg Vogel was as eager as I was to see the big truck run, so we set out to the local schoolyard for some testing. The first item to test was (obviously) the on-board starter. Although we thought it looked a little Rube Goldberg-ish, the system worked very well. All we had to do was push the countergear into place, swing down the retaining bar, install the glow-plug heater, hit the switch and "BbbbRRRAAAPPP," the Thunder King was up and running.

At first, we took it easy so the engine could break in, and we stuck to the parking lot. Even at partial throttle, one attribute of the truck's handling was quite apparent: it turns w-i-d-e. The included S3003 servo simply doesn't have the torque to swing the truck's massive tires,

DUAL-BELLCRANK STEERING

A single Futaba S3003 "standard" servo is provided to steer the King, but the dual bellcranks allow a second servo to be fitted. Another S3003 servo costs less than $20, and you'll have a total output of about 80 ounces of torque in tandem. That's plenty for this truck, and the extra servo is much less expensive than a single high-speed/high-torque servo. Note: MRC now includes two S3003 servos with fully equipped Nitro Thunder Kings.

THUNDER TIGER PRO 21R ENGINE

MRC didn't hold back in the horsepower department. The included Pro 21R engine features true ABC (aluminum piston, brass sleeve with chrome plating) construction for long wear and a precise piston/sleeve fit, and Thunder Tiger claims it will put out 2hp at 30,000rpm. A massive, blue heat-sink head is standard, and the included pipe is fitted directly to the exhaust port with a silicone coupler—no manifold. It's not a pretty pipe, but it's "free" and installed—so there. Paradoxically, a glow plug isn't included.

ON-BOARD STARTER

MRC's included starter system is nothing like on-board starters you may have seen on .12-powered vehicles. The King's "big block" .21 engine requires plenty of torque to spin the crank, so a 540 motor is fitted. Wide, coarse-pitch gears put the spin into the crankshaft via a lever that holds a spring-loaded countergear in mesh with the 540 motor and a gear on the engine's crankshaft. Once the engine is fired up and the lever is released, the countergear pops out of mesh and you're off. A momentary switch shuts off the starter system once it has been released, and a 7.2V stick pack powers the system (but is not carried on board).

INCLUDED FUTABA MAGNUM SPORT ELECTRONICS

The Sport radio and S3003 servos arrive installed. The radio settings weren't quite spot on, but they didn't require much fiddling. Although the lack of endpoint adjustment from the transmitter made setup slightly more time consuming than usual, it was easy enough to alter the linkage travel by selecting different holes in the throttle servo horn.

SEALED-GEAR TRANSMISSION

The King uses the same gearbox as its electric cousin, and it includes a complete set of bearings as well as a smooth ball differential.

ADJUSTABLE SLIPPER CLUTCH

The slipper helps the tranny cope with the considerable output of the .21 powerplant and spares the gears from the abuses of throttle-on jump landings and rough terrain.

DISK BRAKE

An aluminum block holds an idler gear that links the engine to the transmission, and the idler shaft is keyed to a single composite brake disk and steel caliper assembly.

CHANNELED ALUMINUM CHASSIS

The King's rugged chassis features 30 degrees of front kick-up and utilizes a separate upper deck to hold the included receiver, receiver batteries, fuel tank and switch assemblies.

ALUMINUM SHOCKS

Plastic dampers just wouldn't cut it on a behemoth like this. The included shocks are heavy-duty all the way and have thick, oversize shafts and nicely anodized bodies. Screw-on caps keep the oil where it belongs, and clamping spring collars allow fine preload adjustment. Damping feels a little on the light side, but heavier shock oil is always an option.

likes

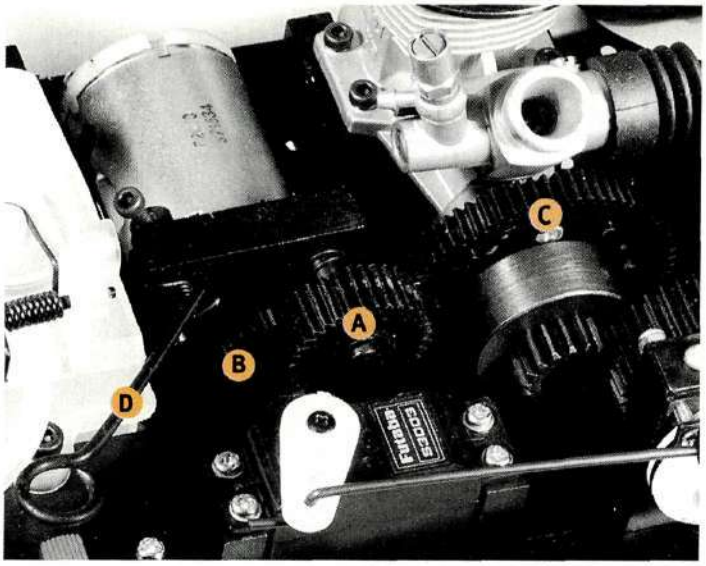
- It's big!
- Sweet Ford body.
- 90-percent assembled.
- Excellent Thunder Tiger engine.

dislikes

- Rear hubs and front rims do not have bearings.
- Starter assembly is exposed.
- Glow plug not included.

so plan your course for sweeping turns and avoid the hairpins. The King ran great, and the motor started to open up nicely after just a couple of tanks. Greg felt we could safely make a few high-speed passes, so I leaned out the high-end needle and let 'er rip.

The Nitro King's low final drive ratio won't allow it to take on an 1/8-scale buggy in a drag race, but it is satisfyingly fast and has stump-pulling torque; that means it can climb steep inclines and churn through rough stuff. It's just as well that the King isn't wildly fast, as the brakes aren't up to the needs of an 8-pound vehicle traveling at high speed. The brake mechanism is fine, and stops were reasonably short, but the standard servo doesn't have the torque to lock up the King's tires.



When starting, the countergear (A) is pushed in to mesh with the starter-motor gear (B) and the crankshaft gear (C) then the hold lever (D) rotate in position to hold the countergear securely in mesh during starting.

After a couple of tanks, the front end became very sloppy. The culprit was a loose bellcrank ball stud, which was easily tightened. The screw that held the stud still had thread-lock clinging to it, so MRC certainly tried to do the right thing. With any gas vehicle, you have to keep an eye out for loose fasteners, and the King is no exception.

With the truck suitably repaired, Greg and I carved up the baseball diamond for a while, but frankly, we wanted to see some big air. The BMX track beckoned. We loaded up Greg's Talon and headed for Bethel Supercross, the local NBL track.

Now, the Thunder King was truly in its element—lots of dirt, and big, big jumps. More than a few bent hinge pins and broken suspension arms have been swept off this track after 1/10-truck launch sessions, but MRC's World Scale kits have been durability champs since day one, so we knew the Thunder King was ready to go hard. I took the controls first, and easily cleared a set of rolling doubles. The truck needed a good head of steam to get airborne; there's so much suspension action that the truck wanted to *absorb* the jumps instead of launch off 'em. Once airborne, the King is super stable. That's not surprising; it weighs over 8 pounds, and the big tires are essentially gyroscopes. Steeper jumps pitched the King up to eyeball level, but landings remained cushy. Aside from a couple of low-end needle tweaks, the truck didn't require attention.

The sun was getting low behind the trees as our gallon of Byron* Race Fuel gave up its last tankful, so we decided we were ready for the "big launch." The largest jump on the track is the first one, and the long, paved start hill is the perfect takeoff runway. I let Greg drive; I just wanted to *watch*. "BbbwwwaaaHHHHH," Greg kept his finger in it as the gravity-assisted King wound out just a few feet from the chest-high jump. The big machine hunkered down as it slammed into the steep jump face, then it unloaded as it popped off the lip. The first half of the launch looked killer—way high (I estimate 8 feet, easy), flat in the air, just sailin'. The big truck touched down about 25 feet later with a body-rattling "whump!"

With its big, tall-sidewall tires and long-travel shocks, the King has plenty of cush for heavy landings, and we used every inch of travel it had to offer. We really didn't expect the truck to come out of the jump unscathed, but it did. So we launched it again—and again—and again. The Nitro Thunder King shrugged it off every time and kept comin' back for more.

FINAL THOUGHTS

How can you not like a big, burly, gas-powered truck that's about as easy to run as an electric? With on-board starting and the friendly Thunder Tiger engine, the Nitro Thunder King quickly fills an afternoon with fun instead of frustration. The only flaw I encountered was the single steering servo, which simply didn't afford the King the steering agility that I know it is capable of from my experience with the electric version.

News flash: just as I send this to the art department for layout, MRC informs me that factory-built Nitro Thunder Kings will be equipped with dual steering servos.

Some of the King's parts may look a little rough around the edges, but if durability is the true measure of quality, then the Nitro Thunder King is 100-percent good stuff. Thumbs up.

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

BUILDING & SETUP TIPS

I tested MRC's factory-assembled Thunder King. To finish off the chassis I had only to install the front and rear body mounts, mount the pipe and install the batteries in the radio and receiver. The throttle linkage was assembled at the factory as well—a rare plus, and much appreciated. To turn the chassis into a truck, a well-detailed (and *big*) Ford flatbed body is included; just add paint. Here are a few tips to help you get the most from the truck:

- The tires are not glued to the rims at the factory, so give them a shot of CA before you hit the dirt.
- Keep a close eye on the truck's hardware; the vibration of the engine can quickly loosen parts. Apply locking fluid (Loctite* blue works well) and retighten any loose fasteners.
- A pair of springs on the brake linkage absorb any additional servo throw once the linkages have reached the limits of their travel; this allows the Futaba* Magnum Sport radio to work effectively without end-point adjustments. However, the springs are relatively weak and compromise braking action. I replaced the springs with fuel tubing that protects the servo but transfers more energy to the brake disk.
- Break in the engine carefully according to Thunder Tiger's instructions; you'll be rewarded with top performance and longer engine life.
- Take care when using the electric starter; if it seems to be laboring hard to turn the engine over, you've probably flooded it. Remove the glow plug, clear out the engine, then give it another try.
- Keep your fingers (and anyone else's) well away from the starter gears when firing up the engine. I even go so far as to leave the starter battery disconnected until after I have loaded the starter gear into place. It takes only the slightest bit of common sense to operate the Nitro Thunder King safely. Respect the equipment.
- Although a single standard servo allows you to steer the King, a dual servo (or single high-torque servo) setup is strongly recommended. Factory-built kits will be equipped with dual servos.

YOU'LL NEED

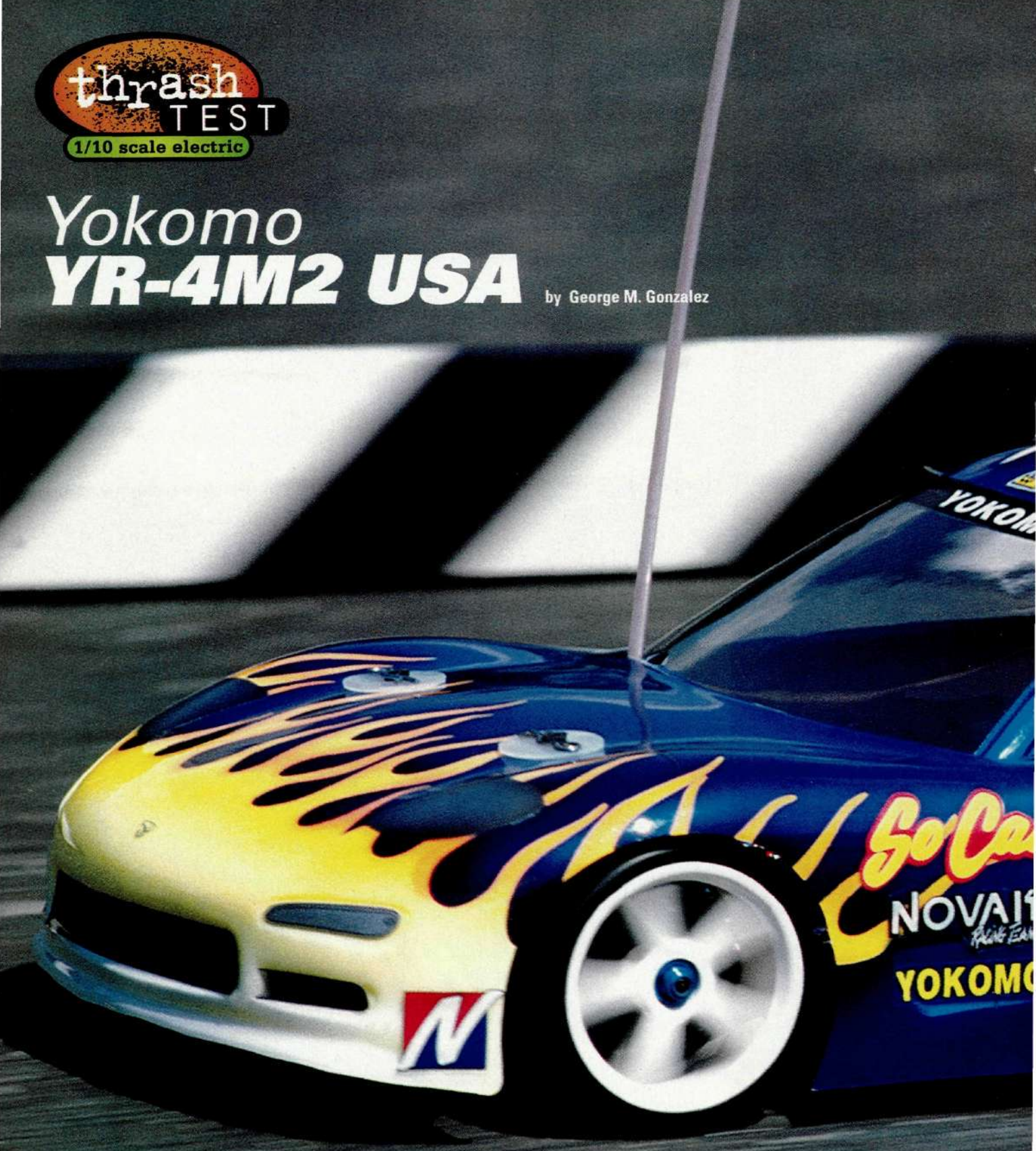
- Glow plug.
- Glow-plug starter.
- 7.2V battery pack (for on-board starter).
- Charger (for 7.2V battery).
- Air filter (will be included with next production run).
- Fuel—15- to 20-percent-nitro recommended.
- 12 AA batteries (use alkaline cells!).
- Radio system with two servos (if purchasing assembled kit without radio).

thrash TEST

1/10 scale electric

Yokomo YR-4M2 USA

by George M. Gonzalez



Yokomo is known worldwide as a leader in 4WD off-road racing and holds or has held just about every 4WD national and world championship title. On the tarmac, Yokomo is becoming better known for its YR series touring cars; specifically, the YR-4M2. Yokomo has recently upgraded the M2 by including new, larger-capacity, hard-anodized shocks as well as*

specs

SCALE	1/10
LIST PRICE	$380

DIMENSIONS

Wheelbase	9.94 in./252mm
Width (F/R)	7.19 in./183mm

WEIGHT

Gross, RTR	56.25 oz./1,598gm

CHASSIS

Type	Double deck
Material	Graphite

DRIVE TRAIN

Type	Belt-driven 4WD
Primary	Pinion/spur
Drive shaft	Universal joint
Differential(s)	Ball
Bearings/bushings	Bearings

SUSPENSION (F/R)

Type	Lower suspension arms with adjustable upper links
Damping	Large-capacity aluminum body coil-over shocks

WHEELS

Type (F/R)	One-piece plastic
Dimensions (DxW)	2x1 in.

TIRES (F/R)	Yokomo Hot Laps Slicks
ELECTRICS	Not included

American Samurai

new shock towers to accommodate the new bouncers. The new version is called the YR-4M2 USA, which is appropriate because Yokomo has also opened a new American facility to ensure that racers get the factory support and parts availability they demand. Join me as I take the new M2 USA through its paces.

PHOTOS BY WALTER SIDAS

YOKOMO YR-4M2 USA

ALUMINUM CENTER POSTS
The two center posts can be attached in seven locations on the center and rear of the chassis. This allows you to adjust chassis flex on the middle and rear portions of the chassis. Up to five additional center posts (sold separately in packs of two) can be installed between the two chassis plates to eliminate all but a slight amount of side-to-side chassis flex.

LOW-PROFILE, DUAL-BELT 4WD SYSTEM WITH FRONT AND REAR BALL DIFFERENTIALS
This belt system allows for a more compact rear gearbox design and places the center layshaft, pulleys and spur gear low on the chassis, which lowers the car's center of gravity (CG).

The front and rear ball diffs are smooth, easy to build and can be adjusted from the outside of the car. They can be removed completely from the car for servicing with only a little dismantling.

HARD-ANODIZED SHOCKS AND LARGER SHOCK TOWERS
The shocks hold considerably more shock fluid than previous units, and this makes them more sensitive to changes in oil viscosity or shock pistons. RCPS* shock diaphragms installed inside each shock make the shocks even smoother and help them last longer between rebuilds.

UNIVERSAL DRIVE SHAFTS
MIP Shiny CVDs replaced the stock steel units.

GRAPHITE CHASSIS
The M2's unique double-deck graphite chassis remains unchanged on the M2 USA. A thin, graphite upper deck is secured to the lower chassis plate with two movable aluminum posts, while the rear portion of the upper deck is secured to the rear gearbox.

UNIVERSAL SPUR GEAR MOUNT
Here, I installed a Kawada 116T, 64-pitch spur.

KOSE* TA03F-PRO ADJUSTABLE BELT TENSIONER
This allows belt-tension adjustments when the belt starts to stretch due to wear. I added an assortment of blue-anodized 3- and 4mm locknuts and conical spacers from OFNA* to dress up the chassis.

ADJUSTABLE BATTERY HOLD-DOWNS
Hassle-free battery changes are accomplished without strapping tape. Graphite battery hold-down plates secure the cells firmly in place. In addition, the batteries can be moved from front to back on both sides of the chassis to adjust weight distribution.

TWIN BELLCRANK STEERING SYSTEM WITH ADJUSTABLE SERVO-SAVER
The bellcranks aren't supported with a top brace. Here, the optional Yokomo servo-saver support is installed for extra security and doubles as a mount for a transponder and antenna.

ADJUSTABLE TOP PLATE
A stiff, coil-spring tension shock is mounted to the front portion of the top plate and completes the bridge over the lower chassis plate. The upper-deck coil spring allows for subtle adjustments in chassis flex that may be used to add or take away some steering.

LOWER A-ARMS WITH ADJUSTABLE UPPER LINKS
Stock steel turnbuckles have been replaced with titanium ones. Suspension arms are molded from a rather soft, nylon composite material, while the front caster and steering blocks and rear hub carriers are molded from a slightly more rigid material.

HOT LAPS SLICK TIRES WITH FOAM INSERTS
The kit includes cool-looking 10-spoke wheels and a complete set of Hot Laps rubber. Yokomo's Inch Up wheels and Sprint tires were used during the modified testing.

YOU'LL NEED
- AM or FM transmitter and receiver (with steering dual rate recommended).
- Steering servo (preferably high-speed).
- 6-cell saddle battery pack.
- Battery charger.
- Stock or modified motor.
- Pinion gear.
- ESC.
- Lexan body.
- CA glue for the tires.
- Basic hand tools.
- Soldering iron.

likes
- Excellent performance.
- High-quality parts and materials.
- Highly tunable chassis.
- The best saddle pack battery hold-down system in the business.
- Lots of graphite.
- Good stock tires.
- Excellent instructions.

dislikes
- Front bumper is too soft and is easily damaged.
- Universal drive shafts, although a great feature, are made of a soft material and can be bent during a collision.
- Steering bellcranks are not supported on top with a brace.
- Suspension arms could be more rigid.

FACTORY OPTIONS
- Titanium turnbuckles (20/16mm)—part nos. ZC-TB20/ZC-TB16.
- Ball bearings for servo-saver (2 pieces)—ZC-201.
- Special motor mount—ZC-304S.
- Drive shaft hard material—ZR-010H.
- Steering hub carrier (zero degrees)—ZC-4130.
- Aluminum kingpin set—ZC-414S
- Aluminum ball ends (threaded/unthreaded)—ZC-401L/ZC-401S.
- Front body mount for competition—ZR-016R.
- Foam bumper—ZR-001FS.
- Upper deck center mounts blue-anodized (pack of 2)—ZR-003MB.
- Bellcrank brace/transponder and antenna mount—ZR-200M.
- Inch Up wheels—ZR-0633.
- Sprint slick tires (firm/medium/soft)—ZR-206F/ZR-206M /ZR-206S.
- Molded tire inserts (firm/medium/soft)—ZR-036 F/ZR-036M/ZR-037S.

TEST GEAR •Hitec Linx FM • Hitec HFS-04MI FM receiver • Futaba S9101 servo • Novak Atom ESC • Reedy Zappers RC2000 6-cell saddle pack • Reedy Silver battery connectors • Reedy Firehawk stock and TC-1 10-turn modified motor

PERFORMANCE

The Yokomo M2 USA was tested over a two-month period at So Cal Raceway in Huntington Beach, CA. The car was raced with both stock and modified motors and was moderately punished by an average racer (me). After spending some quality time with the M2 USA, I could sum up my impressions of the car in just a few words: fast, forgiving and confidence inspiring.

The M2 USA could be raced competitively in the stock class right out of the box. The included Hot Laps rubber tires worked quite well on the high-bite So Cal track surface after they were sauced up with Maxtec* Max Grip Touring Car Tire Traction Additive. Even with the kit's non-silicone shock fluid, the M2 USA handled quite predictably and reached some impressive speeds on the tight So Cal track. Certainly the Reedy* Zappers RC 2000 battery pack and Firehawk stock motor were strong contributors in the speed department.

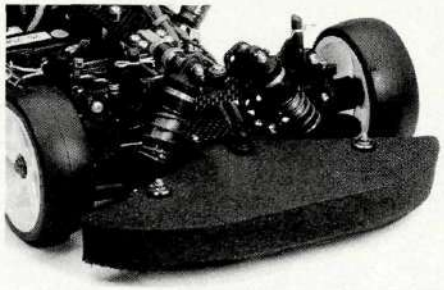
I handed the transmitter to Yokomo factory driver Barry Baker, who was also practicing, so he could critique my setup. Barry was very enthusiastic and grabbed the transmitter right out of my hands. After one lap, he handed my radio back and said, "Your car's tweaked." Well, I *had* actually noticed that the car was turning better in one direction than the other, but I was having too much fun to stop and make corrections. Besides, even with the tweaked chassis, the car was very drivable. Barry offered to "untweak" the car so, naturally, I let him.

I continued to race the M2 USA with the stock mill for a few more weeks before I called in the heavy horsepower. During that time, I attained good results; however, I did encounter a few slight problems.

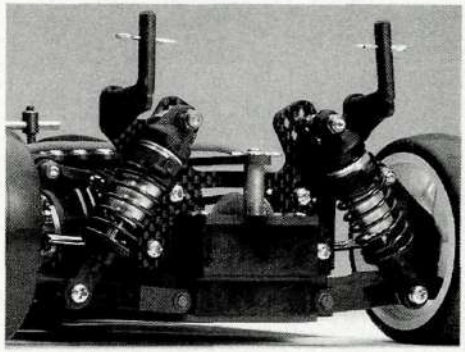
First, the front bumper kept bending out of shape, and this caused it to scrape the track surface, which occasionally messed up the car's handling. I installed Yokomo's competition front bumper, which is made of a more rigid material. I also installed the optional foam bumper (sold separately) to protect the body; problem solved.

Second, the stock universal drive shafts seemed to be "soft" metal; they bent quite easily. I managed to bend the front right and rear left universal on the threaded portion of the axles during the course of my race-testing. Yokomo offers optional hardened universal drive shafts, and I

(Continued on page 172)



Here you can see the M2 USA's larger capacity shocks and new, graphite shock tower. The foam bumper helps protect the body and the chassis in collisions.



Larger shocks are found back here, too. Note the many upper shock and inner camber link mounting locations. Resting inside the compact gearbox is a high-quality, adjustable ball diff.

BUILDING & SETUP TIPS

The M2 USA, despite its complexity, is a relatively easy car to put together. The instructions are concise and include excellent illustrations. The parts fit is nearly perfect, so hobbyists with average modeling skills should have no problems with assembly. The M2 USA does require precision building, so I highly recommend that you take your time. Pick up an inexpensive caliper so that you'll be able to make precise camber rod, shock-length and ride-height adjustments.

- File the edges of the graphite material on all the battery slots to prevent electrical shorts.
- Clean the mounting surfaces on the steering servo and chassis plate with motor spray before attaching the servo.
- Wedge the left side of the servo against one of the aluminum chassis posts to help secure it.
- Install the receiver on its side just behind the servo. If possible, attach it so you can easily access the crystal and connectors.
- Position the batteries as far forward as you can, making sure the battery-mounting system doesn't touch the receiver or ESC.
- Make sure that the locknuts that secure the battery-mounting system are good and tight. You don't want the batteries sliding forward in a collision; this could damage your electronics.
- The YR-4M2 USA is very sensitive to "tweak" and weight distribution. Team Yokomo driver Barry Baker showed how he dials in his car, and his method made my car handle perfectly.

Once you have the motor, batteries and all the electronics mounted on the chassis, place the car on a completely flat surface (glass tables work great). Find the precise center of the chassis (from left to right, not front to back). With the tip of a hobby knife, slowly lift up the front end of the car from the centerline and check to see if one of the front tires leaves the surface before the other. If the left tire leaves the surface before the right one, remove the left front shock and lengthen it by loosening the ball cup ½ turn. If the right tire leaves the surface before the left tire, lengthen the right shock.

You may need to make several length adjustments to the shock, but the goal is to have both front tires leave the surface at the same time. Repeat the process with the rear end of the car. Next, use a caliper or ride-height gauge to measure the left and right sides of the chassis just behind the front tires; the heavier side will require more spring preload. Add a thin preload spacer to the shock on the heavier side. Repeat the process on the rear end of the car, and you should end up with a car that turns equally well in both directions and evenly transfers weight.

MODIFIED RACING SETUP

FRONT END

- Shock oil—80- to 100WT
- Springs—stock gray springs
- Pistons—stock
- Shock mounting location—stock
- Internal shock limiting—3mm plastic washers inside of each shock
- External shock limiting—one rubber O-ring outside of each shock
- Camber—-1 degree
- Tires—Yokomo Sprint (firm compound with medium compound insert)

REAR END

- Shock oil—60- to 80WT
- Springs—stock black springs
- Pistons—stock
- Shock mounting position—stock
- Internal shock limiting—3mm plastic washer inside each shock
- External shock limiting—one rubber O-ring outside of each shock
- Camber—-1.5 degrees
- Tires—Yokomo Sprint (medium compound with medium compound insert)

THE COMPETITION

	Kyosho TF-3	Yokomo YR-4M2 USA	Tamiya TA03F-Pro	HPI RS4 Pro	Schumacher SST 2000 '98	OFNA Z10	Roadrunner XPress
Wheelbase	10.3 in.	**9.94 in.**	10.1 in.	10 in.	10 in.	10.15 in.	10.25 in.
Width	7.75 in.	**7.19 in.**	7.19 in.	7.25/7.125 in.	7.25 in.	7.48 in.	7.25 in.
Diff type	Gear	**Ball**	Ball	Ball	Ball	Ball	Ball
Chassis	Double deck	**Graphite**	FRP**	Carbon-fiber	Fiberglass	Graphite	Carbon-fiber
List price	$259.99	**$380**	$356	$329	$369	$379.95	$385
Available at*	$219.99	**$229**	$199.99	$259.99	$225	$215.99	$225
Reviewed in	1/98	**11/98**	10/96	10/97	12/96	4/97	4/97

*Prices vary with location.
** Fiberglass-reinforced plastic.

thrash TEST
1/10 scale electric

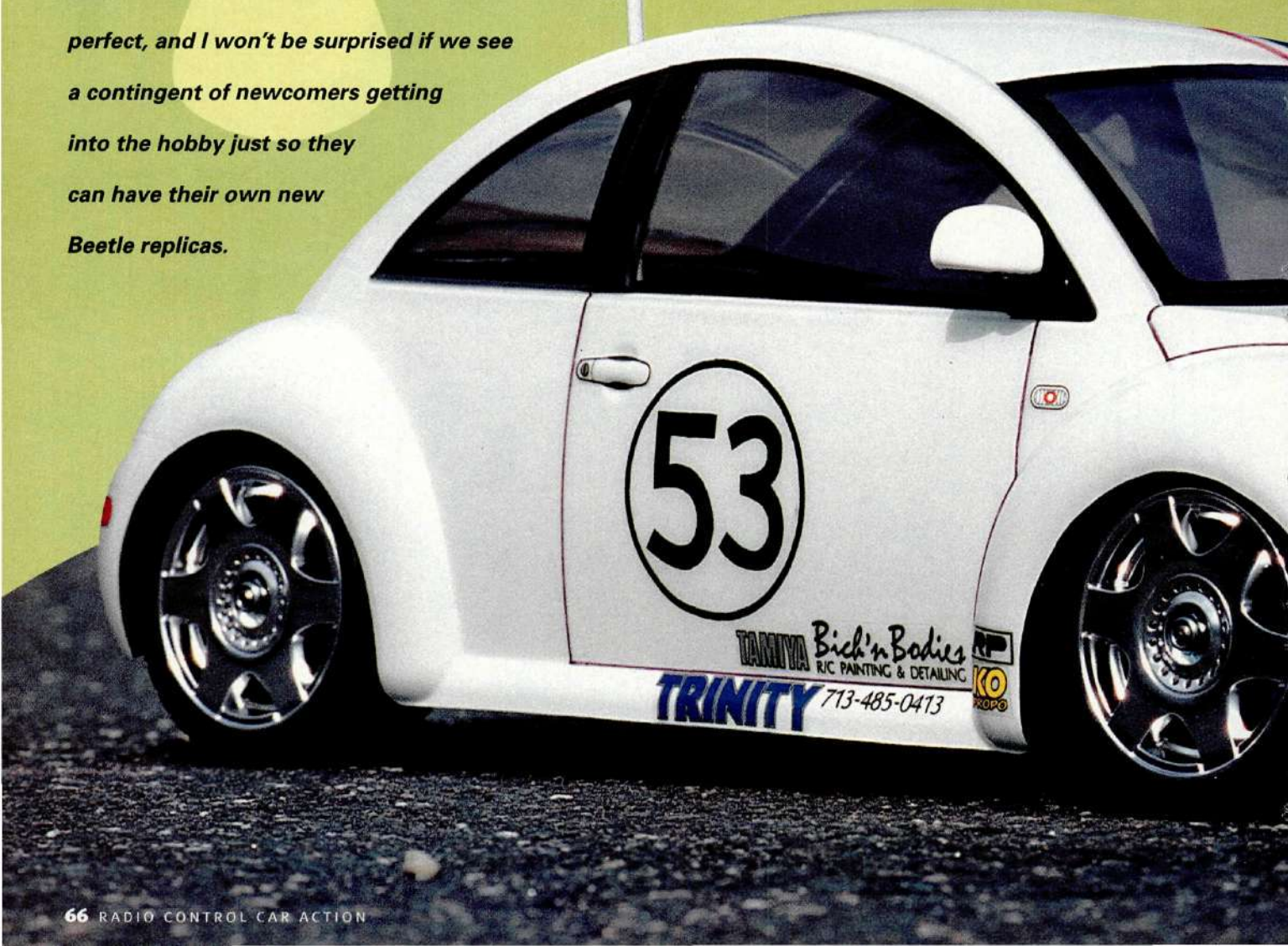
Tamiya Volkswagen New Beetle & Golf VR5

by Greg Vogel

Hot Vee

OF ALL THE notable new vehicle releases in the full-scale world, none was more anticipated than the arrival of Volkswagen's New Beetle. The hype from Volkswagen was actually quite mild compared to the Bug fever spread by both the mainstream press and the motoring media.

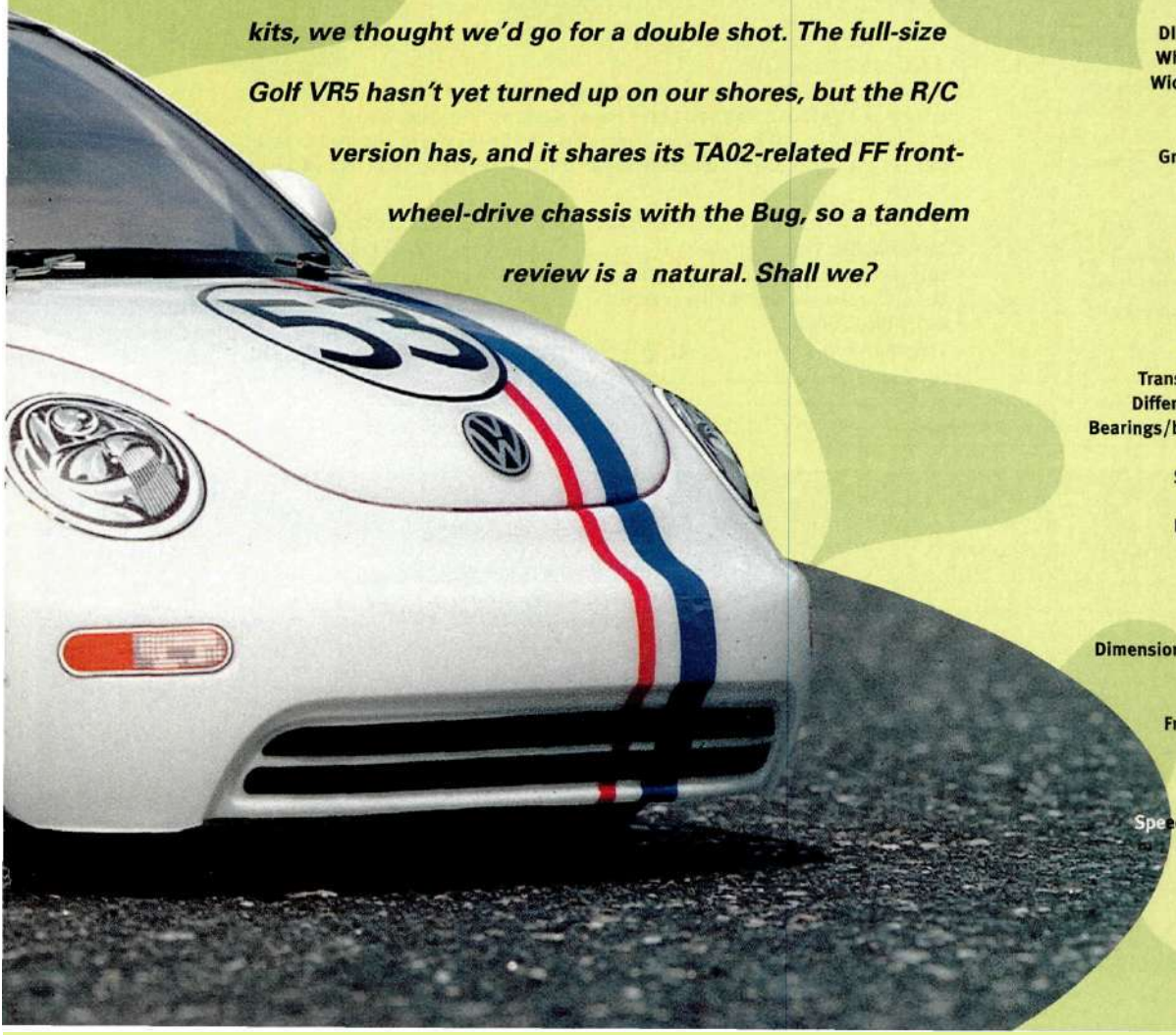
With new Beetles vanishing from dealer lots at a record pace, Tamiya can expect to sell bunches of its 1/10-scale version. It looks perfect, and I won't be surprised if we see a contingent of newcomers getting into the hobby just so they can have their own new Beetle replicas.*



PHOTOS BY WALTER SIDAS

Dubs hit the road

One VW would have been more than enough for this "Thrash Test," but since Tamiya offers two new VeeDub kits, we thought we'd go for a double shot. The full-size Golf VR5 hasn't yet turned up on our shores, but the R/C version has, and it shares its TA02-related FF front-wheel-drive chassis with the Bug, so a tandem review is a natural. Shall we?

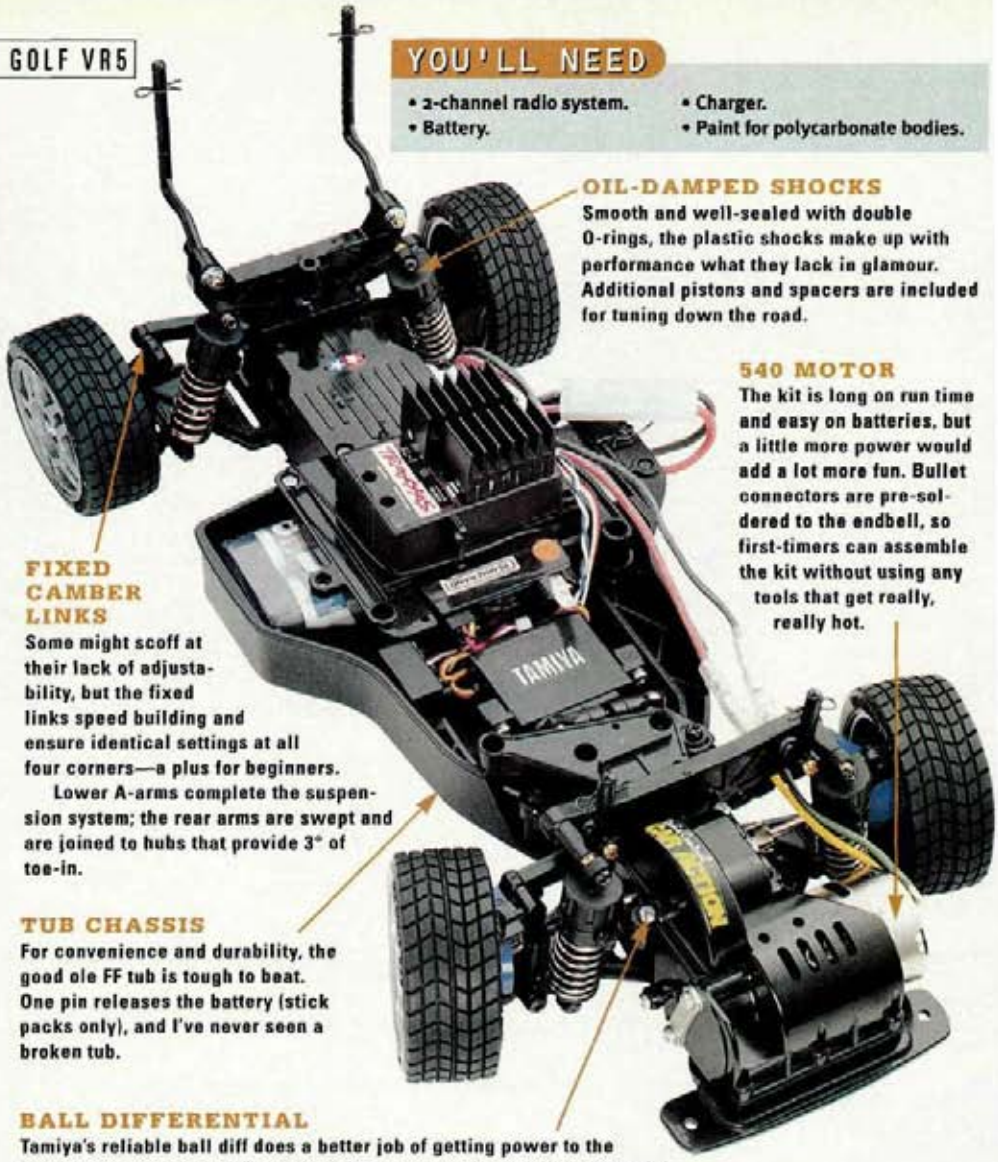


specs

SCALE	1/10
LIST PRICE	$176
DIMENSIONS (chassis)	
Wheelbase	10 in. (255mm)
Width (F/R)	7.1 in. (180mm)
WEIGHT	
Gross, RTR	51.4 oz.
CHASSIS	
Type	Tub
Material	ABS plastic
DRIVE TRAIN	
Type	Gear
Primary	Pinion/spur
Transmission	Dogbone
Differential(s)	Ball
Bearings/bushings	Bushings
SUSPENSION (F/R)	
Type	Double wishbone
Damping	Oil-filled coil-over shocks
WHEELS (F/R)	
Type	Standard sedan
Dimensions (DxW)	2x1 in. (50.8x25.4mm)
TIRES	
Front/rear	Radial
ELECTRICS	
Motor	540 type
Speed control	Mechanical 3-step

YOU'LL NEED

- 2-channel radio system.
- Battery.
- Charger.
- Paint for polycarbonate bodies.



OIL-DAMPED SHOCKS
Smooth and well-sealed with double O-rings, the plastic shocks make up with performance what they lack in glamour. Additional pistons and spacers are included for tuning down the road.

540 MOTOR
The kit is long on run time and easy on batteries, but a little more power would add a lot more fun. Bullet connectors are pre-soldered to the endbell, so first-timers can assemble the kit without using any tools that get really, really hot.

FIXED CAMBER LINKS
Some might scoff at their lack of adjustability, but the fixed links speed building and ensure identical settings at all four corners—a plus for beginners.

Lower A-arms complete the suspension system; the rear arms are swept and are joined to hubs that provide 3° of toe-in.

TUB CHASSIS
For convenience and durability, the good ole FF tub is tough to beat. One pin releases the battery (stick packs only), and I've never seen a broken tub.

BALL DIFFERENTIAL
Tamiya's reliable ball diff does a better job of getting power to the ground than a gear unit. The rest of the tranny gears are very substantial and should last, oh, forever. Two spur gears (66 -and 71-tooth) are included to help match the car's gear ratio to the track and/or motor. All rotating parts ride on bushings.

BUILDING & SETUP TIPS

Since both VeeDubs use the same FF chassis, they are built identically, which is to say they are fun, easy kits to assemble for hobbyists of just about any skill level. The manual will get you through assembly just fine, but a few extra pointers can help:

■ The kit includes a mechanical speed control (MSC), but the manual does not cover its installation. If you plan to use the MSC, open its bag first, examine its separate instructions, and make notes in the main manual to indicate any extra steps required for installation.

■ Some of the screws require a fair amount of force to cut threads in the plastic. Apply a very small amount of grease to the end of the screw to make installation a little easier.

■ Pay close attention to the manual's illustrations when assembling the rear suspension and steering parts. If you rush through, you're bound to install some parts upside-down or backward.

■ When assembling the ball diff, carefully note the size, order and direction of the spring washers, and go easy on the grease; a little goes a long way.

■ Don't slather the transmission gears with grease; just put a couple of "dots" of the slippery stuff on each gear, and it will be evenly distributed as the gears turn. Do not put grease on the pinion or spur gears.

■ Before gluing the tires to the rims with CA, wipe down the bonding areas with distilled alcohol (or rubbing alcohol) to remove any mold-release agent left on the parts by the factory.

likes

- Tamiya bodies—the best!
- Lots of hop-ups available from Tamiya and others.
- Two spur gears included to alter gear ratio.
- Ball-diff-equipped!
- Easy and fun to drive.

dislikes

- Some of the screws are difficult to install.
- Under-powered with kit motor (sure runs a long time, though).

TEST GEAR • Traxxas XL-1 ESC • Trinity Thunder Sport battery • Hitec Lynx radio and receiver • Hitec HS303 servo.

Keepin' it Real!

Good friend Scott Turian flipped when he saw the Golf VR5 in my "to be built ASAP" stack of kits, and he demanded that I finish the car like his own '97 Volkswagen GTI. I agreed (it's a cool car!), but I discovered he had an ulterior motive: he wanted to use the car as an extra crowd- and judge-pleasing tool at car shows.

To duplicate Scott's TSW VX-1 wheels and Dunlop tires, I added Pro-Line* Warlock rims and low-profile rubber; an RPM* Slim Twinz exhaust tip emulates the Scorpion exhaust; and a few decals cut from a Roland's* Stika Plus Design Cutter complete the project. Although the Golf looks racy, the stock motor was retained; this car will be cruising through car shows, not laying down high-speed laps!

For more precise throttle control and to avoid burning up the mechanical speed control resistor with continuous partial-throttle operation, I installed a Traxxas* XL-1 ESC. If you're looking to upgrade your own car from a mechanical controller, the XL-1 will let you do it on the cheap; it's the least expensive reversing ESC available.

Building a "Super" Beetle

Volkswagen produced its own Super Beetle back in the original Bug's heyday (I had a '74 myself), so I thought it only fitting to create my own "super" Beetle and base it on the new body design, replete with all of Tamiya's many hop-up parts and a Herbie-esque paint job. Whereas the original Herbie was the "Love Bug," I like to think of my creation as the *Lust* Bug; one look at the carbon-fiber chassis, aluminum shocks and other goodies on my creation, and you'll be lusting after one of your own. —*Peter Vieira*

This is about as trick as an FF chassis gets. Thanks to the powerful mod motor, efficient ball bearings and universals and a bunch of lightweight parts, the "super" Beetle can eat up a lot of real estate in a very short time. It's one ballistic Bug!

TAMIYA PARTS

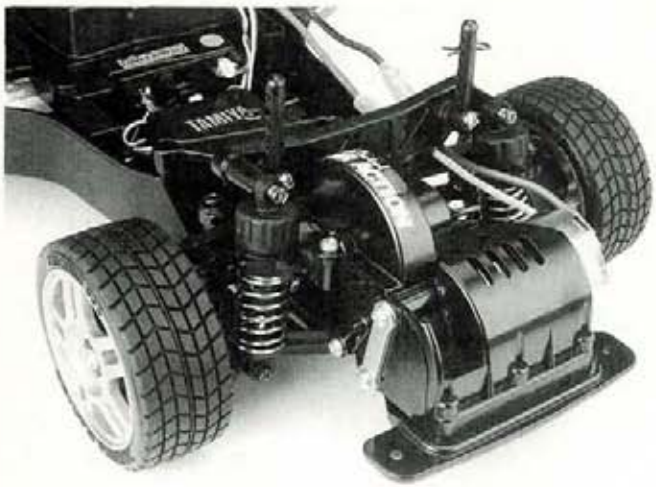
- FWD aluminum motor heat sink—part no. 53177.
- TA03 super-low-friction damper set—53280.
- Tune spring set—OP-163.
- FWD touring-car ball-bearing set—53137.
- Carbon-fiber chassis plates—53195.
- FRP chassis (includes plastic parts required to install part no. 53195)—53166.
- FWD hollow carbon gear-shaft set—53165.
- 1/10 touring-car aluminum front hub carriers—53226.
- Aluminum servo stay—OP-308.
- Universal shaft set–53172.
- Stainless-steel hinge pins—OP-98.
- Aluminum ball connectors—OP-284.
- Turnbuckle tie rods—OP-191.
- Aluminum diff pressure-plate set—53219.
- Type B belted tires (not shown)—53294.
- Shaped tire inserts—OP-250.

ELECTRONICS

LRP* V6 ESC • Hitec* 525BB servo • KO Propo* Presto transmitter and KR297 receiver • Trinity GT-1 12 x 2 motor • Trinity Ex-Tech 2000mAh stick pack.

PAINT

Special thanks to Bich'n Bodies* for the perfect Herbie paint job. The numbers are hand-painted!



Tamiya's front-wheel-drive system positions the motor right behind the front bumper. Oil-filled dampers and a ball differential are standard equipment.

Nothing complicated in the rear: the wheels are bolted to a pin-type axle. Tamiya supplies screw-type hinge pins and fixed upper camber links that ensure an easy-to-build, user-friendly suspension setup.

PERFORMANCE

With the kit motor in place, the FF chassis doesn't have much top end, but it runs for a good 10 minutes on a sport-type pack (I ran a Trinity Thunder Sport). Since the front wheels do all the driving and steering, the rear wheels are just along for the ride, so you'll never spin out because you got on the gas too hard, too soon. You might light up the front tires and cut a wider turn, but you'll still be headed in the right direction. The only way to break the rear of the car loose is to set up for a right turn, then cut the wheel to the left (or vice versa). The car will get out of shape, but it will snap to attention as soon as you mash the throttle. It's fun.

Stopping power is tremendous, since all the weight is transferred to the front wheels, which do all the braking. It can, however, get a little sketchy if you lock the wheels; with the FF's front-drive system, all steering goes out the window when the front wheels lock. Oh, the front wheels will swing left and right well enough, but the car ain't turnin'. Let off the brakes to allow the front tires to hook up, and you're back in control.

FINAL THOUGHTS

Either of the Volkswagens would be an excellent choice for a first kit, and if you're a Golf or new Beetle owner, how can you resist? Even if you only buy the car for its scale-model-that-moves appeal, you'll be getting a fully upgradeable chassis that is capable of exciting performance. For the seasoned driver who's looking for a new experience, the front-drive platform will be sure to put a smile on your face. *R/C* drivers wanted!

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

thrash TEST

1/12 scale gas

Kyosho Nitro Blizzard

by Greg Vogel

TTACK!

DIEHARD R/C ENTHUSIASTS will surely remember the original Kyosho* Blizzard. The tank-like vehicle with Snow Cat body and dual electric motors was just as much fun to look at as it was to run. Well, Kyosho has just released a brand-new Blizzard that's guaranteed to be even more exciting than the original because it's nitro-powered. But there's more; the Nitro Blizzard comes equipped with a forward and reverse, 2-speed transmission that's guaranteed to increase the fun factor. Decked out with a Snow Cat body, the all-terrain Nitro Blizzard should be able to run on dirt, grass, asphalt and basically anything you can throw under it. But enough hype; let's lay down tracks.

specs

SCALE	1/12
LIST PRICE	$399.99

DIMENSIONS (chassis)

Length overall	14.4 in. (365mm)
Width	12.6 in. (320mm)
Clearance	1.2 in. (30mm)

WEIGHT

Gross, RTR	4.9 lb. (2,259gm)

CHASSIS

Type	Plate
Material	Aluminum

DRIVE TRAIN

Type	Gear
Primary	Clutch bell/spur
Transmission	2-speed centrifugal/ forward and reverse
Differential(s)	Gear
Bearings/bushings	Bushing

SUSPENSION

Type (F/R)	Torsion style

ENGINE

Type	Kyosho GS-11X
Carb	Barrel
Exhaust	Muffler

BUILDING & SETUP TIPS

During my 13 years in R/C, I had built just about everything—everything, that is, except a tracked vehicle. The Nitro Blizzard offered a perfect opportunity to see how my skills would hold up when faced with a new challenge. With the help of Kyosho's illustrated instructions, building was fun and easy, though a little time-consuming. To ensure that the parts are fitted properly, the pictures have to be studied extra carefully, and I think you'll find these hints useful.

■ As usual, use liquid thread-lock on all the screws that make contact with metal. The Nitro Blizzard vibrates a lot and vibration loosens screws.

■ Grease the moving parts inside the transmission. Apply grease sparingly to parts such as the axles that are exposed to the elements, or the grease will attract dirt, and that will cause premature wear.

■ Although leaning out the engine will increase power, you should run it slightly rich; the 2-speed-and-reverse tranny can give it a real workout.

SNOW CAT-STYLE BODY

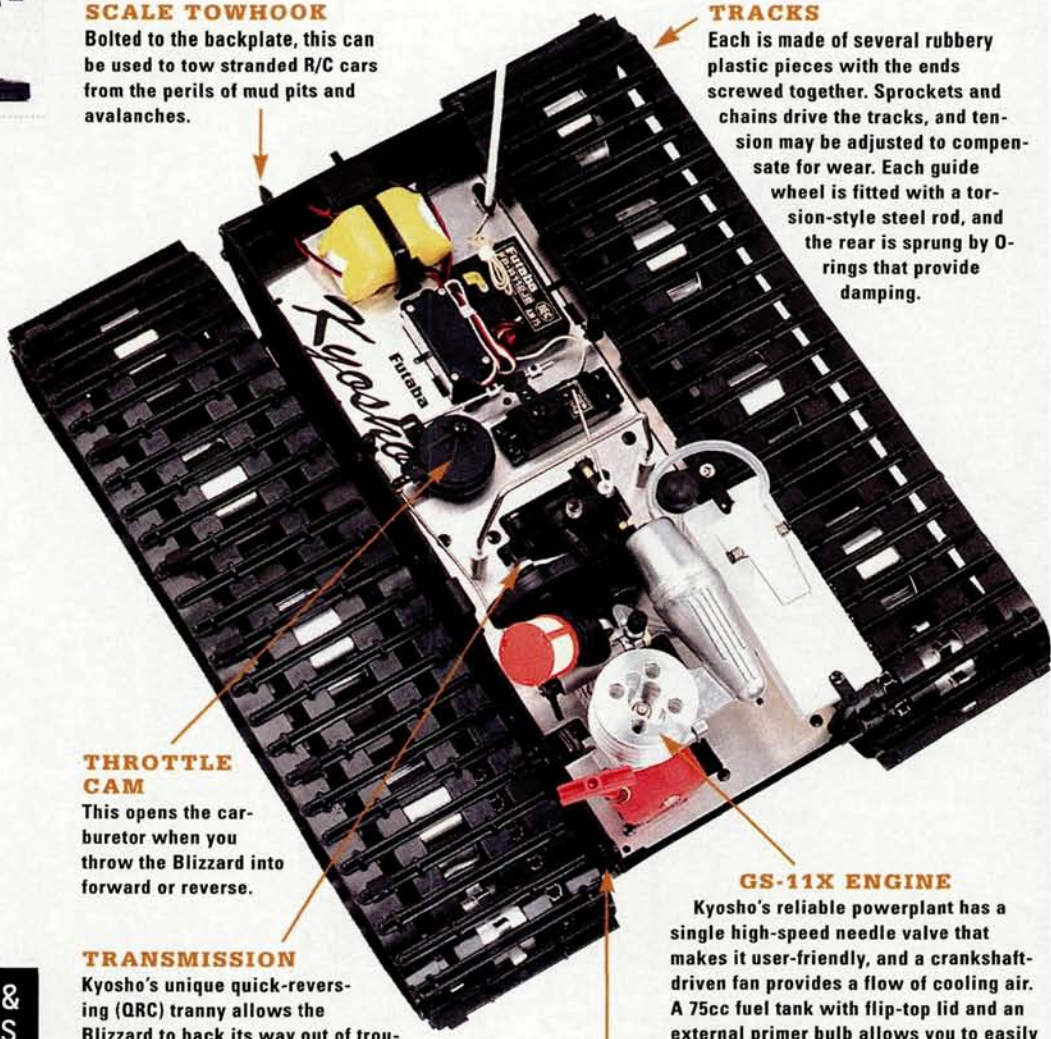
The cab area of the body is held on with Velcro®-brand fastener and can easily be removed when you want to start the engine or fill the tank.

SCALE TOWHOOK

Bolted to the backplate, this can be used to tow stranded R/C cars from the perils of mud pits and avalanches.

TRACKS

Each is made of several rubbery plastic pieces with the ends screwed together. Sprockets and chains drive the tracks, and tension may be adjusted to compensate for wear. Each guide wheel is fitted with a torsion-style steel rod, and the rear is sprung by O-rings that provide damping.



THROTTLE CAM

This opens the carburetor when you throw the Blizzard into forward or reverse.

TRANSMISSION

Kyosho's unique quick-reversing (QRC) tranny allows the Blizzard to back its way out of trouble and do dirt-kickin', snow-slinging tricks. A reliable 2-speed unit also adds to the cool factor and helps give the Blizzard that extra kick it needs to conquer obstacles.

If the reversing transmission seems familiar, it's because it's the same tranny you'll find in the Kyosho Baja Beetle and Dodge Ram. Inside the sealed gearbox reside bulletproof bevel-gear differential and ring and pinion gears. The power is fed to the tracks via a cast-aluminum coupler and a solid steel axle.

GS-11X ENGINE

Kyosho's reliable powerplant has a single high-speed needle valve that makes it user-friendly, and a crankshaft-driven fan provides a flow of cooling air. A 75cc fuel tank with flip-top lid and an external primer bulb allows you to easily pump fuel into the engine, and that ensures quick fuel stops.

HEAVY-DUTY METAL SIDE PLATES AND STAMPED-ALUMINUM CHASSIS PLATE

These give the Blizzard a rugged, stable foundation. Composite skidplates are wrapped around the front and rear of the chassis.

YOU'LL NEED

- 2-channel radio system.
- 12 AA batteries.
- Glow-plug starter.
- Fuel.
- Paint.

FACTORY OPTIONS

- Steel diff-gear set—part no. FZW-18.
- Bearings—1901 (5x10), 1911 (4x8).
- Fuel filter—39308.
- Vespel clutch shoe—39671.
- Receiver protector—92392KP.

PERFORMANCE

We often have difficulty deciding where to test a vehicle, but this definitely wasn't the case with the Nitro Blizzard. Any surface is fair game for this terra terror!

I started it up on the asphalt behind the *Car Action* offices and scooted it around for a while to break in the engine. It won't break any speed records, but I could tell it packed a lot of power.

The asphalt just wasn't enough of a challenge, so I went looking for dirt and hills at the local park. I found a ton of obstacles

TEST GEAR • Futaba* Sport radio system w/ 3003 servos • DuraTrax* receiver battery• Byron 10-percent-nitro fuel

ADVERTISEMENT

Team ORION MOTOR TECH

with Oscar Jansen

PART TWO

Understanding Winds, Turns and Motor Types

There are essentially just two types of motors for use in IFMAR-, ROAR- and NORRCA-sanctioned electric R/C competition: stock and modified.

A stock motor is one that has a good balance of performance and cost, and normally, this type of motor is inexpensive. It is very often used as a "standard" motor, which means that it is the standard for a certain competition event.

As the name implies, a modified motor is essentially a stock motor that has been altered (modified) for ultimate performance within the rules for competition. Here are the basic features of a "mod" motor that are not found in its stock counterpart:

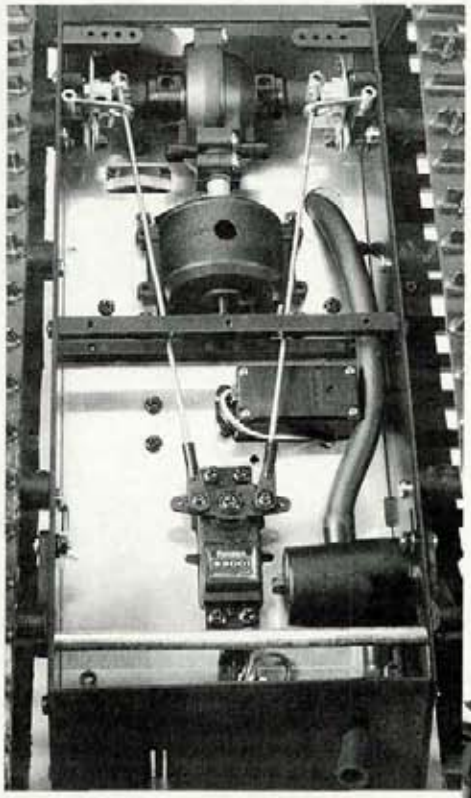
• **Adjustable timing.** "Timing" refers to the position of the motor's brushes (which are held within the endbell) relative to the magnets; turning the endbell counterclockwise will increase the motor's rpm. Timing is fixed on a stock motor; 24 degrees is typical for most competition worldwide.

• **Variable winds/turns.** Mod motors may vary the thickness and number of strands of wire that are wound around the armature to tailor the motor to specific applications. In general, the lower the turns (the number of times the wire is wrapped around the armature), the faster (more speed/power) the motor will be, but it will use more energy (resulting in a shorter run/race time). The "winds," or number of strands of wire used in each "turn," can also vary.

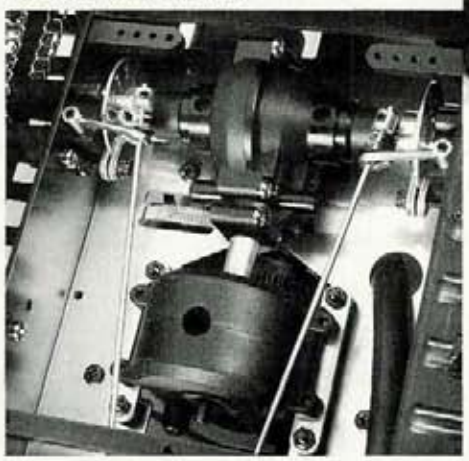
Stock motors are wound by an automated winding machine that can handle up to four strands of wire (a "quad" wind). In the USA and in Europe, the most common wire is 22AWG, with 27 turns of a single strand on each pole. Other combinations of winds and turns may be used within the rules for stock motors; it is quite possible to find a 12-turn triple (three strands wrapped 12 times) armature in a stock motor can.

Modified motors may be assembled on the same type of winding machine, and this is the means of production for inexpensive mods. However, machines do not use the limited space on the armature as efficiently as a skilled technician who winds by hand. The human touch allows the wire to be wound much more tightly and precisely. Less wire is used, and this reduces the electrical resistance and, thus, increases performance. The latest technology in winding, used in Team Orion Pro Modified motors, is the pattern winding system. With this system, the wires are wound perfectly parallel without crossing and, if necessary, they are built up into a peak so the available space is used as efficiently as it can be. This reduces the length of the wire (and the attendant resistance) even more.

Next month, we'll look at the different applications for various wind and turn combinations and unveil more tuning info. See you then!



Above: the Blizzard's underside is covered with a butyrate dirt shield; when it's removed, you can see that the exhaust flows into a second chamber before it exits the rear.



Above: what! No brakes? Well, the Blizzard has two stainless-steel disk brakes, but they aren't used to stop it. Instead, they steer it: by limiting the power going to one of the tracks, they force the Blizzard to steer toward that side. As you turn the transmitter's wheel, the steering servo will activate one of the disk brakes and will slow or lock one of the tracks, depending on how tightly you wish to turn. Right: chains on both sides drive the tracks. The chains can be adjusted to compensate for wear.

that made testing the Blizzard an absolute blast. The Blizzard tore up and down rutted hills and went over rock piles like a tank. On a dry, sandy area, I cut the steering full right while keeping the throttle pegged. The Blizzard spun around on its own axis throwing up tons of sand in the process–extremely cool!

Throwing this baby into reverse adds a lot of excitement to an already entertaining machine. After countless runs, I headed back to the workshop to check for wear and loose parts. A few screws were loose,

likes

- Exotic vehicle—something different.
- Goes just about anywhere.
- 2-speed, reversing drivetrain.

dislikes

- Needs more frequent maintenance checks than other vehicles.

The 2-speed reversing tranny bumps up the Nitro Blizzard's fun-factor score and takes a lot of abuse. The clutch for the second gear can be adjusted quickly with an Allen wrench.

but apart from that, the Blizzard was in mint condition. I was impressed by how well the drive train took the abuse that I threw at it.

FINAL THOUGHTS

Looking for something new, different and fun? The Nitro Blizzard just might be the answer to your year-round excitement needs. Though I really beat on it, it always came back for more—a testament to the high quality of Kyosho's parts. Kyosho has done an excellent job of reviving an alternative vehicle that breaks all the rules. The Blizzard isn't for speed seekers—it tops out at about 5mph—but its terra-conquering capabilities should fulfill any enthusiast's need for ground-pounding action with a tracked vehicle.

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

thrash TEST
1/10 scale electric

HPI RS4 Mini Pro

by Peter Vieira

Admit it: as soon as you saw the RS4 Mini, you knew that this car, the Mini "Pro," was bound to follow. The HPI crew loves graphite goodies and go-fast stuff as much as you and I, and I'm sure you'll agree that we love that loot even more when it all comes in one box. The time and energy required to track down all the cool stuff is spared, and although the "Pro" Mini will take a bigger bite out of your budget than the standard RS4 Mini, it's definitely cheaper than hopping up a stocker to match the Pro. But how well does the Pro run? After all, the RS4 Mini earned high marks in the May 1998 issue; can the Pro be that much better?*

mini

specs

SCALE	1/10
LIST PRICE	$379

DIMENSIONS

Wheelbase	8.9 in. (225mm)
Width (F/R)	6.3 in. (160mm)

WEIGHT

Gross (as tested)	46 oz. (1,304gm)

CHASSIS

Type	Double-deck
Material	Woven carbon-fiber

DRIVE TRAIN

Type	Belt
Primary	Pinion/spur
Drive axles	Universals
Differential(s)	Ball (F/R)
Slipper clutch	None
Bearings/bushings	Bearings

SUSPENSION (F/R)

Type	Lower A-arm/upper link
Damping	Oil-filled, coil-over shocks

WHEELS

Type	One-piece, 5-spoke
Dimensions (DxW)	1 x 1.7 in. (25 x 42mm)

TIRES (F/R) HPI Mini X-Pattern Belted

ELECTRICS Not included

HPI RS4 MINI PRO

BUILDING & SETUP TIPS

If you've built any of HPI's RS4 vehicles, you have a pretty good head start on the RS4 Mini Pro; you'll recognize many familiar parts. You can expect a very smooth "build," thanks to excellent instructions and—for the most part—logically laid-out parts. You will have to raid the suspension parts bag for extra E-clips, and you'll need sharp eyes to spot some of the molded parts before you pluck them from their "trees." There aren't any brainteaser steps to clarify, so my building tips are really just ideas to streamline the building process.

■ Step 1 (shock assembly). Pay close attention to the part numbers on the up-travel spacers; the illustrations show spacers of equal thicknesses, but the parts are actually different sizes.

■ Step 2 (differential assembly). As you probably already know, you can use a pair of hex keys or screwdrivers to hold the diff halves while you try to rotate the diff pulley to check the diff's tightness. Here's the thing: the diff flanges are sharp; if you grab them tightly and try hard to rotate the diff, you might cut your fingers (I filleted myself, thank you). Pad your fingers with a rag and use a reasonable amount of pressure to test the diff, not an "Incredible Hulk" twist.

■ Step 10. Use an X-Acto knife to remove some material from the rear hubs for wheel clearance. The hubs are pretty thick, so don't try to trim them in big whacks. Just slice off a little at a time; you'll get neater results, and it's a quick operation—about half a minute per hub.

■ Steps 19 and 22. Use Loctite* on the A183 pilot shafts for the belt tensioner and steering bellcrank, just to be safe. Using thread-lock on any fasteners that are installed in metal parts is always a good idea.

■ If you want to install an S9102 servo as I did, you'll need to enlarge the servo-mounting hole in the upper deck and slightly extend the screw slots. To do this, I placed the upper deck in a vise and used a fine file to remove material. To achieve a factory look, I used the tops of the vise jaws as a guide to keep the sides of the hole square.

BELLCRANK STEERING
The steering servo is suspended from the upper deck and uses a kit-supplied servo-saver that is joined via a wire drag link to a bushed bellcrank (also suspended from the upper chassis deck.) The system works; no bump-steer is evident. On the bummer side, the steering tie rods are simply threaded rods, not turnbuckles.

BELT TENSIONER
You won't find this piece on the standard Mini. The molded bracket holds an adjustable bearing roller to tension the belt, and it also supports the layshaft.

DUAL BELTS AND BALL DIFFERENTIALS
Ball diffs are standard "Pro" fare for HPI. They can be quickly built, but go easy on the CA when gluing up the flanges. The rear diff rides in eccentric supports that can be rotated to adjust belt tension, and all the RS4 Mini Pro's rotating parts spin on high-quality, sealed ball bearings.

QUICK-RELEASE BATTERY TRAY
Off-the-shelf RS4 parts, tried and true.

GRAPHITE CHASSIS
As you might expect, HPI selects premium carbon-fiber/graphite plate for the upper and lower decks. The pieces match the standard Mini's fiberglass parts in size and shape, but they're lighter and stiffer.

NEW REAR SHOCK TOWER
The low-profile rear tower debuts on the Mini Pro; its design was required by the low-slung Miata body that is included in the kit.

UNIVERSAL DRIVE SHAFTS
In long-wheelbase mode, the Mini Pro requires the rear drive axles to sweep back to reach the hubs, and that's tough on dog-bones. The supplied universals keep power delivery smooth and chatter-free.

ADJUSTABLE WHEELBASE
By flipping the rear suspension arms, you can change the Mini Pro's wheelbase from 225mm (shown) to 208mm. All four suspension arms include setscrews to adjust ride height; these screws can also be used to "tweak" the car.

FIXED FRONT CAMBER LINKS
Turnbuckles would be nice, but they would have to be very short and deeply angled to reach the hub carriers—a recipe for binding. The included one-piece units provide 2 degrees negative camber, and HPI includes optional links that yield 4 degrees. The rear camber links are threaded.

MINI X-PATTERN BELTED RADIAL TIRES
Ah, the good stuff. The soft tires include foam inserts and fit tightly to the Pro's 5-spoke hoops. The package looks killer when combined with the curvaceous '98 Mazda Miata body.

ALUMINUM SHOCKS
HPI's bladder-equipped, aluminum-body dampers are smooth performers and easy to assemble. A complete set of pistons is included for fine-tuning, as are numerous pre-load clips.

TEST GEAR
• Futaba* 9102 steering servo • Tekin* G9 ESC • Team Orion* V-Max 2000 stick pack • Deans* connectors • Team Orion Super Touring 16x2 motor • Futaba Magnum 3PJ radio and FPR113F receiver

PERFORMANCE

I took the RS4 Mini Pro out to the *R/C Car Action* staff's usual haunt, R/C Madness in Enfield, CT. A fresh slab of pavement was recently laid down expressly for touring-car racing, and the track configuration is always challenging. The fully juiced-up Mini was an absolute rocket on the back straight that spans the full width of the track. Its speed was silly, in both a good and a bad sense; fast is fun, but I could barely control the car!

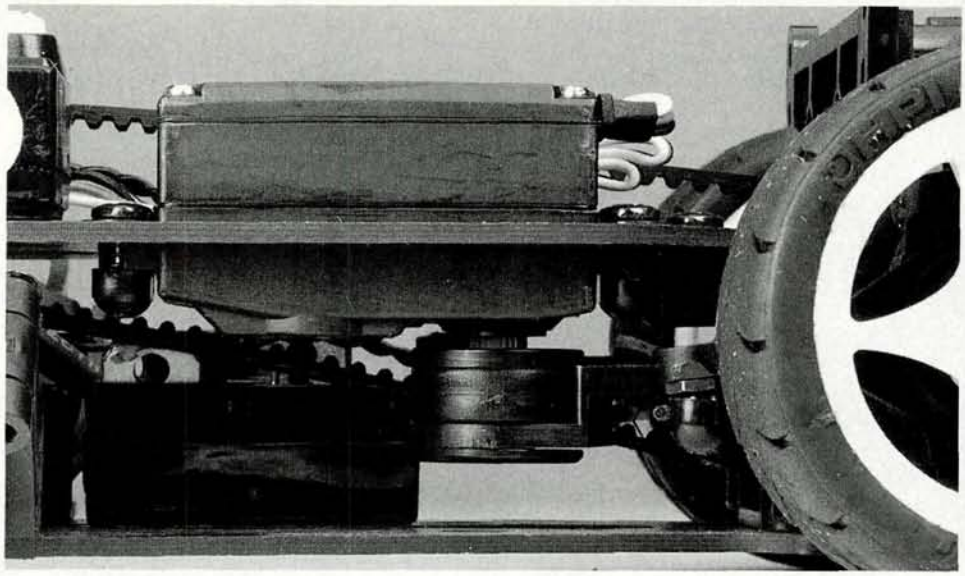
The short, narrow Mini responds instantly to any steering input, especially with the sticky kit tires; a light touch at the wheel is very necessary, and dialing in some expo helps. With the stock setup, the car handled well with the

YOU'LL NEED

- Radio gear.
- Stick-pack battery.
- Charger.
- Electronic speed control.
- Steering servo.
- Motor.
- Polycarbonate-compatible paint.

FACTORY OPTIONS

- 2.4mm carbide diff balls—part no. A156.
- Aluminum pilot shafts—A169.
- Swaybar set—A209.
- Graphite rear shock tower (not for use with Miata body)—A218.
- Heat-sink motor plate—A248.
- One-way pulley (14T)—A254.
- One-way pulley (15T)—A255.
- 2-speed transmission—A285.
- One-way front diff—A506.
- Slipper clutch—A507.
- Tuning springs (soft copper/hard gold)—6824/6826.



A standard-size servo sticks up mighty high once installed on the Mini Pro's top deck; to help keep the CG low, I installed a low-profile Futaba S9102 servo.

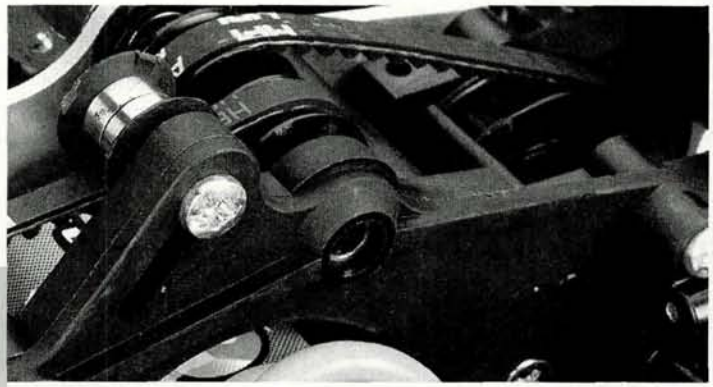
power on, but it was a little loose when braking and accelerating. I blame that on too much horsepower and not enough contact patch rather than on any bad handling attributes. Unfortunately, the tight Madness track is all about braking and accelerating, and I looped the car often. I let a steadier hand take the wheel. Shop owner Chris Marcy ran off a pack and clicked off much better lap times than I could muster (note to self: practice driving and worry less about the car) then proclaimed the setup "pretty good" as it was. Chris whisked the car away and installed "softer" no. 2 pistons in the front shocks for a little more rear bite. "Sounds backward," I said, but Chris assured me the trick worked for his Nitro RS4. Sure enough, the car felt a little tighter. There's no substitute for experience—right, Chris?

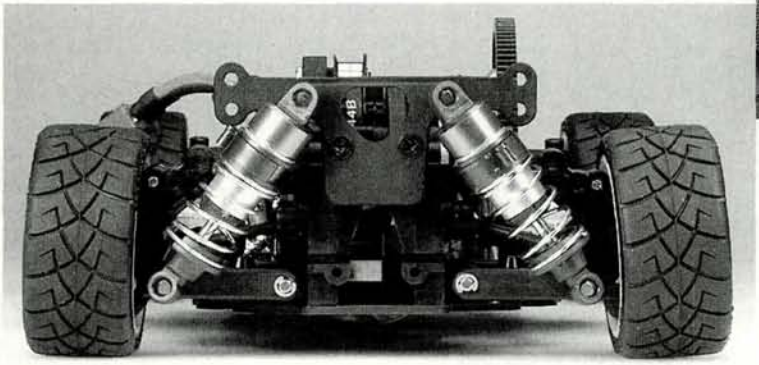
FINAL THOUGHTS

The RS4 Mini Pro delivers a lot of performance in a small package, but go easy when you select a motor; less is more. If blinding-fast speed runs are what you're after, feel free to bolt in a low-wind mod; mechanically, the Mini Pro can handle whatever you throw at it. However, the small tires and short, narrow chassis can cope with only so much power in the turns. Unless your track or parking-lot course is all sweepers, you'll have more fun with a milder motor (your batteries and ESC will thank you, too). I plan to spend more time getting the Pro dialed for my driving style (I need a little bit of understeer) and just plain practicing. The RS4 Mini Pro will definitely be up for a "Second Look" soon!

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

Right: this bearing-supported belt tensioner keeps the front belt in check.





Like the RS4 Sport and Pro, the Mini Pro's rear bulkheads have plenty of space between them to allow pebbles and other debris to exit the belt system. Note the minimalist shock tower.

likes

- All the cool hop-ups are in the box.
- Adjustable wheelbase suits a variety of bodies.
- Convenient battery holder.
- Razor-sharp handling.

dislikes

- Limited space for electrics.
- High center of gravity with standard servo.
- No turnbuckles.

THE COMPETITION

	HPI RS4 Mini Pro	Tamiya M01	RoadRunner GTO
Wheelbase	8.9 in.	8.25 in.	8.25 in.
Width (F/R)	6.3 in.	6.25/6.25 in.	6.25 in.
Weight	46 oz.	45 oz.	45.6 oz.
Diff type	Ball	Bevel gear	Ball
Chassis	Carbon-fiber	Deep, molded tub	Carbon-fiber
List price	$379	$218	$325
Available at*	$139.99	$126.99	NA
Reviewed in	11/98	9/95	4/97

**Prices vary with location.*

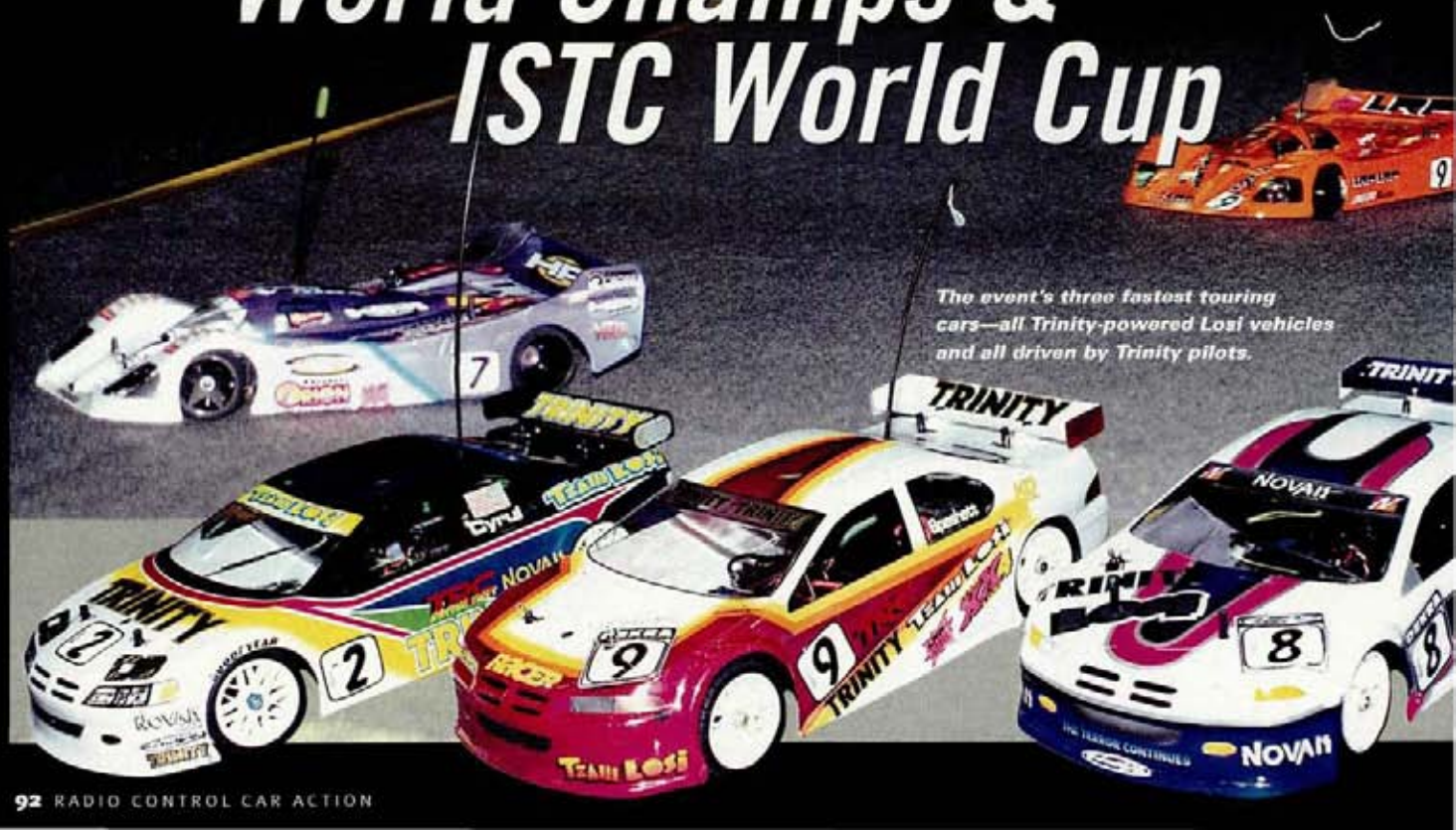
BATTLE OF BRITAIN

THE IFMAR 1/12 and 1/10-Scale Electric On-Road World Championships are held every two years and always hosted by a different country. You may remember that it was last hosted by the United States at Revelation Raceway in Montclair, CA. Japan's Masami Hirosaka and our very own Mike Swauger won the 1/12- and 1/10-Scale World Championships, respectively. The '98-'99 Worlds was hosted by Great Britain and held in beautiful South Shields—a small coastal town nine miles south-east of Newcastle.

Racers from all over the world competed for the ultimate title in R/C racing, and top R/C manufacturers fielded factory teams of the world's finest

Trinity owner Ernie Provetti (left) congratulates Trinity team driver David Spashett for winning every event.

IFMAR ELECTRIC ON-ROAD World Champs & ISTC World Cup



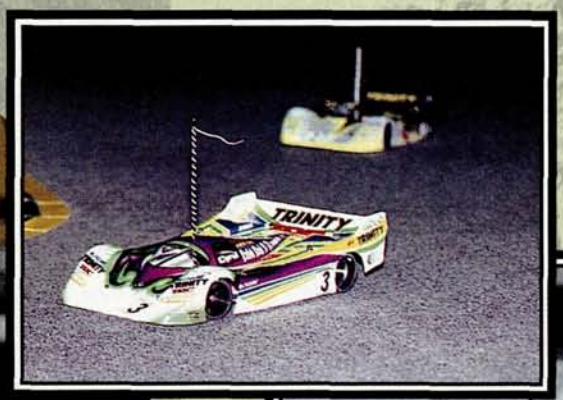
The event's three fastest touring cars—all Trinity-powered Losi vehicles and all driven by Trinity pilots.

BY GEORGE M. GONZALEZ

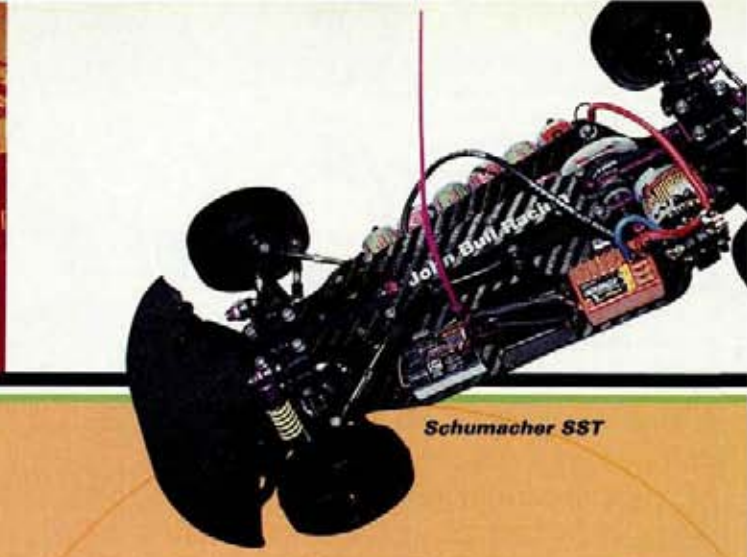
Left: Joel Johnson works on his secret weapon ... I mean his Street Weapon. Center: Team Trinity's Josh Cyrul; he was hot during all of the competitions. If he hadn't incurred a 10-second penalty in 1/10 scale, he might have won. Right: a Team Trinity mechanic, Ryan Hand, readies Mike Blackstock's car for one of the controlled practice heats.

drivers. The very generous principal sponsors, HPI Racing and Team Orion, made sure that the event was run professionally and that the drivers—independent and factory team—were treated fairly and well accommodated.

A 1/12 and 1/10-scale world champion was crowned, and for the first time, an International Scale Touring Car (ISTC) World Cup was added to the venue. In the special ISTC Manufacturer Team World Cup event, 10 manufacturers vied for the honor of having their entrants crowned as the world's fastest touring car team. Though this ISTC World Cup was considered to be nothing more than a formal exhibition, it was by far the most popular class and had nearly as many contestants as the 1/12- and 1/10-scale classes combined. Is this perhaps an indication that the sanctioning organizations affiliated with IFMAR—ROAR, EFRA, FEMCA and FAMAR—should offer racers and factory teams an official world championship just for touring cars?



PHOTOS BY GEORGE M. GONZALEZ



Schumacher SST

WORLD CHAMPIONSHIPS PROTOTYPES

This year's IFMAR World Champs had more new cars and products than any other world event I have covered. It's refreshing to see that R/C racing is still highly competitive. Here are a few of the prototype cars that I found particularly interesting.

HPI RS4 WORLDS?

HPI showed up with a slightly massaged RS4-Pro that was designed to tackle the Worlds' carpet track. Its compact chassis was designed to accommodate only saddle packs, and they're in the center for improved steering. The completely new front suspension has rigid upper arms and all-new geometry. In the rear, new pivot blocks add a little more toe-in.

The RS4 prototype was the lightest vehicle entered in the ISTC class, and several ounces had to be added to the chassis to make it legal. Racers found that the English pound coin was perfect as ballast. HPI has no plans to release this car as a kit, but some of its features may show up in future kits or may be available as hop-up options.

YOKOMO YRX-10 '98

Yokomo's new YRX-10 '98 Pro-10 pan car turned a lot of heads in the pits because it's such a great departure from the previous YRX design. The inline battery mounting and pivot-ball rear suspension have been replaced with a more conventional saddle-pack and T-bar rear pod. Eight battery slots allow several battery configurations, and the T-bar allows simple chassis-tweak adjustments. The car also features shorter front arms for less camber roll, and its front track has been widened slightly.

Yokomo YRX-10 '98

CORALLY PROTOTYPE C10

Corally made some significant changes to its popular C10 Pro-10 pan car for the Worlds. Most notable is the new chassis that's heavily braced by a graphite upper deck. Eight battery slots on the lower chassis plate allow several battery-mounting possibilities. The car also features a new T-bar design and a front beam with a camber bar. No doubt about it; this is one trick-looking ride.

Corally Pro 10 car

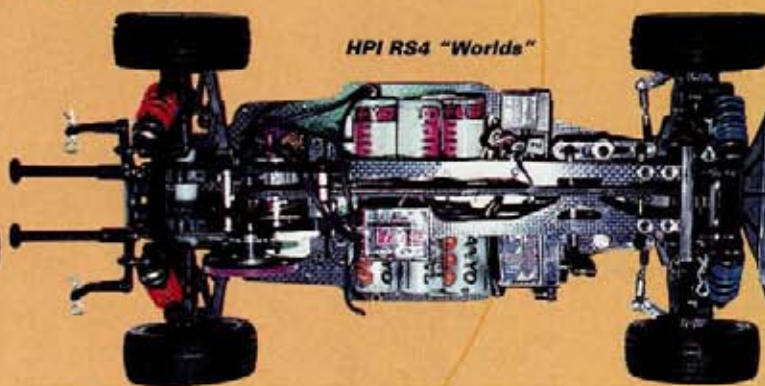
GM RACING TOURER

GM entered the touring-car war with its new TC4 4WD sedan. If you look closely, you might find it bears a striking resemblance to the OFNA Racing Z10 Pro. Well; the truth is, this car is actually a European version of the Z10, but it has been subtly changed. For the most part, the GM car uses thicker graphite chassis components, and it may come with several significant hop-ups as standard items. Chances are, we won't see this version sold in the States, since OFNA is doing very well with the Z10, which is distributed by most of the major hobby distributors.

BULLETPROOF SCHUMACHER SST

This Schumacher SST looks as if could survive a bombing. This particular prototype features a new chassis with an improved steering-servo mounting position and an improved battery-mounting system that includes a graphite battery strap. Check out the front tie-rod upper arms. As you can see, the front suspension is well supported to reduce flexing. This car is also equipped with the company's new Micro Shocks, which are just as smooth but considerably lighter than the stock shocks. Keep your eye out for Schumacher; it has a ton of cool products planned for release in the upcoming year.

GM TC4



HPI RS4 "Worlds"

Left: Team Orion's Oscar Jansen; he drove an HPI RS4. Center: David Spashett concentrates as he pulls out an EX-tra Team pack. He never dumped once! Right: Team Yokomo's Masami Hirosaka (left) and Team GM's Jon Orr watch a touring-car heat.

The cool, damp weather was a refreshing change of pace, especially for those of us from warmer parts. On the other hand, those who were used to Northern England's climate found it a bit warmer than usual. I traveled from Southern California and was especially glad to get away from triple-digit temperatures. And rain was never a problem because the event was held indoors at South Tyneside's Temple Park Center—one of the best sports facilities in Northern England.

Now join us as we journey to the United Kingdom to witness the 1/12- and 1/10-scale Electric On-Road World Championships.

CONFUSING SCORING

Racers in both scales competed in a maximum of nine qualifying heats, and three rounds were held each day. A first in a qualifying heat earned 155 points; second, 154 points; and so on down the line to zero for a 155-place finish—that is, if all 155 drivers had competed. None of the direct-drive pan-car classes had more than 80 racers signed up, so the lowest qualifying score was in the 80s. Racers combined their six best scores to establish the qualifying order; the 10 with the highest scores were Worlds A-main finalists.

Naturally, the driver with the highest score was TQ and awarded the pole position on the grid for all three legs of the 4-minute A-mains. The Mains were scored as follows: a first was worth 10 points; second, 9 points; and so on. A driver's lowest score was thrown out and used only in the event of a tie.

The ISTC competition was scored completely differently and was more of an endurance race. Drivers competed in a maximum of 15, 5-minute heats and were awarded points according to their finishing positions: first, 20 points; second, 17 points; third, 15; fourth, 14; fifth, 13; and so on all the way down to 8 points for 10th. A driver's best seven finishes were counted to obtain his final score and award the Individual ISTC Championship. The heats and grid orders were shuffled so the drivers had to compete against a different group of racers and start from a different location on the grid each time.

In the Manufacturer Team ISTC World Cup event, teams were each theoretically allowed up to six drivers, but loopholes in the rule books allowed some to have as many as 12. In the end, it didn't really matter how many drivers a particular team had because only the combined points of the team's best four were used to arrive at a final score. The team with the highest score was declared the IFMAR Manufacturer ISTC World Cup Champions. Team Losi, Yokomo, HPI (Europe and USA), Schumacher, Kyosho, Corally (debuting a new sedan), Roadrunner Xpress, GM Racing (European version of the OFNA Z10) and M1Racing (European/Asian version of the Xpress Pro) all fielded a team.

1/12-SCALE OVERVIEW

• **Qualifying.** After all nine qualifiers, the lap-counting computer calculated the scores and the qualifying order, and the A-main grid was determined. With 930 points, Team Trinity driver David Spashett (Great Britain) claimed TQ honors and the grid's prime spot for the triple A-mains. His best time was a 31/8:11.78. Team Trinity's Josh Cyrul (USA) chalked up 916 points to earn the spot next to the pole, and he ended up with a 31/8:24.10 best time. Team Yokomo/Maxtec driver Barry Baker (USA) ended up with 907 points in third. With his 31/8:15.51 best time, Baker was 9 seconds faster than Cyrul but had a slightly lower overall score. Team Yokomo driver and reigning 1/12-scale World Champ Masami Hirosaka (Japan) was the only other driver to join the élite 31-lap club, and his best time was only a microsecond slower than his teammate Baker's best time.

Joel Johnson (Team Trinity, USA), Jon Orr (Team GM/Associated, USA), Oscar Jansen (Team Orion, Holland), Craig Drescher (Team Associated/Reedy, Britain), Andrew Griffiths (Team AGR/Trinity, Britain) and Mike Swauger (Team Associated/Reedy, USA) qualified fifth through 10th, respectively.

• **A-main.** It all came down to the final leg of the triple A-mains, since David Spashett won the first leg and Josh Cyrul won the second. A win for either one would earn the 1/12-scale World Championship. Spashett got a great start and shot out in front to lead Josh Cyrul and Masami Hirosaka around the circuit for an entire lap before things started to get ugly. Early on, Cyrul clipped a board going through Mo's Island (named after its creator, this is a

BIG IN EUROPE

cost-controlled racing

Here in the States, Bolink's Legends and Trinity's Street Spec events are familiar forms of cost-controlled racing, but in Europe, Mardave* 1/12-scale Mini racing is the low-cost alternative to big-budget racing.

The Mardave Mini shown here costs around £40 (about $60) and features a simple, rugged design that's perfect for first-time racers. The kit is based on a flexible fiberglass chassis with a straight-axle, direct-drive drive train and rigid front and rear suspension. The kit includes a forward and reverse mechanical speed control, a 540 motor, hard-compound foam tires and a practically indestructible ABS-plastic Mini Cooper body with an ingenious quick-release body-mounting system. The Minis run on 4-cell packs, and to ensure that the racing is as fair as it can be, no hop-ups of any type are allowed. The Mardave Minis are not yet available in the U.S., but the company is looking for distributors.

hairpin turn with an island) and was thrown to the outside marker; there, it was punted by Hirosaka's car and then thrown onto oncoming traffic, where it was abused some more. The collision severely damaged the chassis, and moments later, Cyrul was out of the race.

Spashett found nothing but clear track in front of his car and was soon gone in a blaze of glory. Jon Orr found himself in second, while Hirosaka managed to hang on to third. Meanwhile, Spashett's lead continued to increase, and Orr and Hirosaka battled for second, but Joel Johnson was not far behind and had his sights set on getting in on the action.

With 6 minutes down, Johnson managed to get around Hirosaka and then made an amazing pass around Orr to claim second. Unfortunately, his second-place position was short lived because less than 2 minutes later, his batteries started to go flat and his car slowed to a crawl. Orr and Hirosaka soon blew past him to reclaim their second and third places, and the race ended with them in that order.

David Spashett took the 1/12-scale World Championship for the second time in his career. After the points had been tallied, Jon Orr's precision driving had earned him the overall second place and will undoubtedly increase his standings

new in the pits

NEW FROM PEAK PERFORMANCE

Peak Performance introduced a new motor and battery line at the Worlds, and these should be available by the time you read this. The company's new EBX Pro Modifieds are available in various winds to fit every type of racing. The motors are all hand-wound, epoxy-balanced and are factory broken in and dyno-tuned to ensure optimum performance.

The company's new PowerFlo batteries are the first to carry the Peak Performance label on each cell. All the cells undergo Peak's own voltage-increasing system and are matched and discharged at 30 amps. The batteries will be available in three performance levels to fit all racers' needs and budgets.

The Club-level packs are perfect for those Saturday night club races and offer plenty of bang for the buck. The Club-level cells undergo Peak's voltage-increasing system and are closely matched. The National-level cells are intended for high-level competition; they offer higher discharge voltage rates and longer discharge times than the Club-level cells. Peak will also offer World Championship-level cells that are the same cells used by Peak Performance team drivers in top-level racing events.

Peak Performance EBX Pro Modifieds and PowerFlo Cells are available through all major U.S. distributors, and PowerFlo cells are distributed throughout Europe by Team Schumacher Racing.

New Peak Performance motor.

New Peak Performance PowerFlo cells.

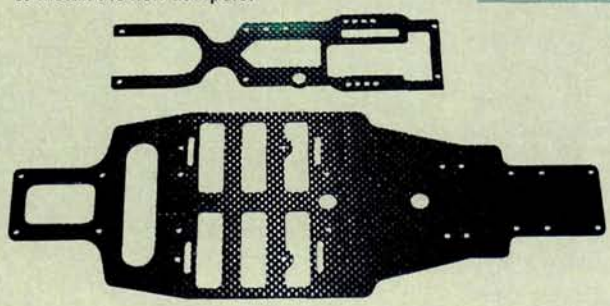
LOSI'S THREADED SHOCK BODIES

The Team Losi drivers were all using Losi's new threaded shock bodies for the company's ISTC World Cup-winning Street Weapon. Here, the shock bodies are installed on world champion David Spashett's car. They will probably be available by the time you read this and will be offered as hop-up accessories. The threaded shock bodies make it easier to adjust spring preload more accurately. They are made of the same hard-coated material as the standard shock bodies and include white plastic preload adjusters.

New Team Losi threaded shock bodies.

ROADRUNNER EXPRESS SUPER TUNING PARTS

GHI announced the release of several performance-enhancing parts for the Roadrunner Express Pro and Express Junior touring cars. First on the list is the super-thick, 3mm carbon-fiber chassis that is much more rigid than the stock graphite chassis. The new 3mm top plate is also thicker than the stock top plate, and when combined with the 3mm chassis it provides a foundation that's as stiff as it can be. The 3mm front and rear shock towers are also noticeably stiffer than the stock units; they prevent flexing during extreme racing conditions. The new aluminum-anodized shock bodies are extremely smooth and hold more shock fluid than the stock plastic units, and they feature red-anodized shock caps to match the rest of the car's hardware. The shocks come with all the hardware, so nothing else is needed to install the new dampers.



Above: Roadrunner's new anodized shocks. Left: the new 3mm chassis and upper deck components.

in the highly competitive 1/12-scale arena. Many-times world champion Masami Hirosaka had to settle for third overall, while Joel Johnson took fourth overall.

ISTC WORLD CUP
156 heats of nonstop action

To complete the 156 heats scheduled for the three days, three rounds of heats were run every day. This meant that the pace was fast and the racers were kept on their toes at all times. The round-robin points-scoring system practically ensured that several drivers would end up tied on points toward the end of the event and need to have their fastest times from their seven best finishes called in to help settle matters.

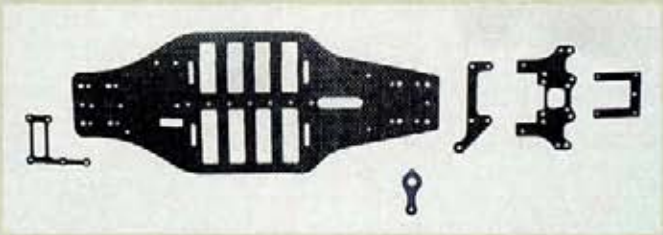
After the first day, Team Losi was in the lead in the Manufacturer Team competitions because David Spashett, Josh Cyrul, Joel Johnson, Mike Blackstock and Rick Hohwart finished extremely well in all of their heats and set a pace that was very difficult to follow.

On the second day, however, Barry Baker and Masami Hirosaka started to shake things up for Yokomo, and the scales started to tip the other way. David Spashett, Joel Johnson, Josh Cyrul, Mike Blackstock (Team Losi/Team Trinity) and

YOKOMO YR4-M2 HOP-UPS

New Yokomo YR-4M2 alloy gearbox halves.

All of the Yokomo team drivers were running the company's new graphite chassis components—with great results. The new, lower chassis plate is lighter than the stock YR-4M2 chassis because the sliding battery holders have been removed. Eight battery slots allow racers to mount the cells in a variety of ways, although most of the team drivers settled on a 4x2 battery-mounting configuration. New, lighter shock towers and upper gearbox covers are also available. In addition, a new servo-saver support and upper bellcrank brace/transponder mount can be installed. Yokomo released several new alloy drive-train parts, as well, and shown here are the new, blue-anodized aluminum gearbox/bulkhead sides.

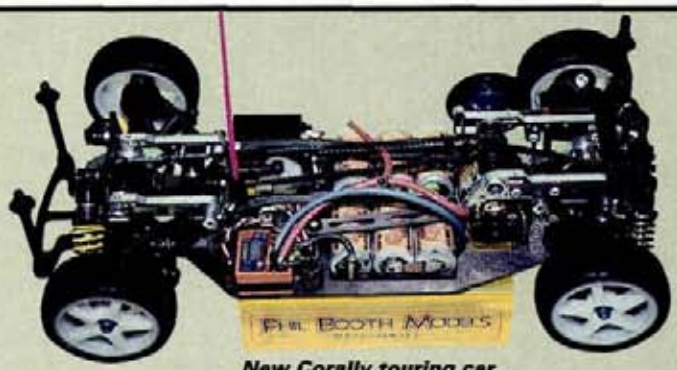


New Yokomo YR-4M2 chassis components.

NEW FROM KO PROPO

KO unveiled its new EX-5 Master AM 2-channel computer radio for those racers who have been looking for an inexpensive, feature-packed computer radio. The unit features 2-model memory, electronic trims (both steering and throttle dual rates with individual endpoint adjustments), servo reversing and an LCD display. The unit will be available with a KR-293A receiver and PS401 servo and should be priced quite attractively.

New KO EX-5 radio.



New Corally touring car.

CORALLY GOES TOURING-CAR RACING

Corally's new 4WD touring car, which had not yet been named at the time of this writing, caused quite a stir in the pits (and on the track). The new car is based around a super-stiff, double-deck, carbon-fiber chassis and was outfitted with a ton of machined-aluminum drive train and suspension components (although it has been rumored that many of the alloy pieces may be made of molded plastic). The car features a unique, fully floating rear end with built-in tweak adjusters, front anti-roll bar, large capacity shocks and specially designed drive shafts that are completely horizontal to the track surface when the car is set up with the standard 6mm ride height. A conventional, dual-belt 4WD system is used but the unique "wide open" gearbox halves are truly original. In addition, the car is built to take advantage of IFMAR's 190mm maximum width and must use standard zero-offset wheels to remain legal. We're not sure whether this car will ever be available in the U.S., but it would be a welcome addition.

NEW FROM SCHUMACHER

It's a fact that many racers and hobbyists love colored, anodized aluminum. Machined aluminum parts can actually strengthen vital areas of a car's drive train and suspension, but in certain situations, all the machined aluminum pieces do is add weight to your car and empty your wallet. If you own a Schumacher SST '98 touring car, though, you can add a flash of purple anodizing without adding weight or emptying your pocketbook. Schumacher's "Purple Chrome" plastic pieces look like purple-anodized aluminum but weigh (and cost) less. Shown here are SST '98 upper suspension mounts (sold individually), servo mounts and antenna mount. The pieces look just like Schumacher's purple-anodized-aluminum parts and once installed, only you will know they're plastic.

Schumacher's new Purple Chrome Plastic parts.

Team Losi ISTC Manufacturer World Cup Team. These guys were fast! Left to right: front row—Jukka Steenari, Mike Blackstock and Josh Cyrul; back row—Gil Losi Jr. (team captain), David Spashett, Rick Hohwart, Joel Johnson and Ron Rossetti (team mechanic).

Barry Baker and Masami Hirosaka (Team Yokomo) were soon all tied with perfect scores (seven wins totaling 140 points). In addition, each scored 20-lap wins in each of the seven heats for a grand total of 140 laps. Knowing this, the drivers were determined to improve their fastest times, but the opportunities to do so were running out. On the last heat of the day, Spashett turned in a scorching 21-lap run that put him in the lead.

Team Yokomo's ISTC World Cup team battled hard and almost took it all at the end (left to right): Barry Baker, Mike Swauger, Greg Hodapp, Masami Hirosaka, Jon Orr and Craig Drescher.

At the start of the third and final day, Team Losi and Team Yokomo were officially declared to be tied on points for the Manufacturer Team World Cup competitions. Even though Spashett was one lap ahead, the overall Individual Championship was still within the grasp of all the aforementioned drivers. Cyrul ended up posting a 21-lap run in his final race to tie things back up with his teammate, but in his final heat, Spashett came back with a 21-lap run to win the Individual Championship. Cyrul ended up in second, while Johnson secured third.

Team Losi's domination of the final heats put them over the top to win the Manufacturer Team World Cup Championship. The celebration started immediately after the final heat, and the cheers for Team Losi were so loud that they were probably heard all the way back in the USA. Check out the charts for the drivers' overall finishing positions and the Manufacturer Teams' final points.

PRO 10

• **Qualifying**. After nine extremely close rounds, Team Trinity's David Spashett was the TQ again with 926 points and an amazing 20/4:1.17 best time. If he had been just 1 second faster, he would have been the only driver to complete 21 laps—a feat that many considered to be impossible. Although Mike Blackstock (Team Trinity, USA) had his share of bad starts and

WHERE THE WORLD'S GREATEST DRIVERS CLASHED!

The Temple Park Center facility was the perfect venue for the prestigious IFMAR Worlds. The facility's many amenities offered racers, mechanics, race directors and spectators many ways to relax during the times when they could bear to tear themselves away from the track. They enjoyed the indoor pool and Aquablaster wave machine, a gymnasium with free use of weights and exercise machines, and a complete cafeteria with a viewing area that overlooked the main hall where the event took place. And these were only a few of the luxuries available for those who also had the luxury of spare time.

The track was in the main hall, which is often used for events such as rock concerts, exhibitions, gymnastic competitions and wrestling matches. Rooms with viewing areas surround this hall, so hundreds of people caught sight of the racing, and many were curious enough to come down to where the action was.

In a large display area at the entrance to the main hall, manufacturers displayed their products and had spokespeople on hand to help the racers and answer the spectators' questions. The hall itself held a complete hobby shop stocked with R/C cars and accessories.

The enormous track's modular design allowed the maintenance crew to change its layout for the different racing classes. The 1/12-scale racers were treated to a tight roadcourse that ensured close racing action. Then the touring-car drivers enjoyed a giant track with wide lanes and a 150-foot, high-speed straightaway that led into a sweeper and allowed speeds approaching 40mph! The infield, on the other hand, was incredibly technical, so racers had to carefully gear their cars to have enough out-of-the-corner punch and top speed and still be able to complete the 5-minute heats. The final layout—for 1/10 scale—also had an intricate infield that kept the competition close and a long straightaway leading into a high-speed sweeper that allowed the direct-drive pan cars to almost reach 50mph.

At the end of the super-long straightaway, a large KO Propo banner took abuse as cars flew off the track. In an inspired moment, track officials drew a bull's-eye in the "O" of "KO," and many drivers scored perfect full-speed hits.

The heavy-duty metal fence on which the banner hung was not very forgiving; I'll never forget seeing Team Xpress driver Dave Loftin score his first bull's-eye when his servo-saver loosened as his car came off the straightaway at over 30mph. I think he felt the hit all the way up on the two-story drivers' stand because he nearly fell off it. Who knows? Maybe R/C darts will be the next big fad. I'd hate to be the one sponsoring the contestants, though!

Here are just a few of the people who used Team Orion batteries and motors with great success. The Team Orion motors have been available only for a couple of months, yet nearly 20 percent of the contestants used them.

occasional blunders on the track, he drove consistently enough to earn 921 points and the spot next to the pole on the A-main grid. Blackstock's best time was a 20/4:3.40. Josh Cyrul (Team Trinity, USA) was the third qualifier with 918 points and a superfast 20/4:1.73 that earned Team Trinity the top three spots on the grid for all three of the A-mains.

Reigning world champion Mike Swauger (Team Yokomo, USA) qualified fourth with 914 points and a 20/4:5.90 best time. Joel Johnson, Jon Orr, Craig Drescher (Britain, Team Associated), Masami Hirosaka, Tony Neisinger (Team Associated, USA) and Andrew Moore (Britain, Corally) qualified fifth through 10th, respectively.

• **A-Main.** *First leg*: controversy raged before the race had even started. During the 10-second countdown, Josh Cyrul's car moved forward about one car length and then came to a complete stop before the timer reached zero and the starting tone was sounded. He was penalized a full 10 seconds for a false start, and that pretty much guaranteed that he would finish very poorly.

Meanwhile, TQ David Spashett used his prime grid location to full advantage and safely went around the first corner before the dreaded first-turn pileup. Cyrul also avoided the carnage and pursued Spashett aggressively. At the first corner, Mike Swauger was the first to sort things out, and he claimed the third spot. After a couple of minutes, Spashett gave way to teammate Cyrul, and the two continued this pace—out of danger, half a track ahead of the rest of the field.

At around the halfway point, Swauger tried to close the gap behind the leaders, and Craig Drescher, Jon Orr and Masami Hirosaka started the battle for fourth. Cyrul and Spashett continued to lead, but Spashett knew that he would win the first leg even if he crossed the line behind Cyrul because Cyrul had a 10-second penalty that would be added to his time.

Orr took fourth and started to catch Swauger. When the final buzzer sounded, Cyrul had crossed the line first with Spashett a few seconds behind and hotly pursued by Swauger and Orr. With the penalty points, Cyrul was given eighth—ultimately his throw-out round—Spashett took first, Swauger claimed second and Orr was in third.

The 1/10-scale World Championship top three (from left to right): Jon Orr (USA, third), David Spashett (Britain, first); and Joel Johnson (USA, second).

After the race, Trinity's Ernie Provetti contested Cyrul's false-start penalty, but IFMAR and BRCA officials said his rolling start had been caught on tape and the decision was final. Provetti argued that since the 10-second countdown had not ended, the race should have been stopped and the car put back where it belonged. Both sides of the controversy had compelling arguments; I thought the 10-second penalty a bit too severe. A 2-second penalty would have been more appropriate and still would have put Cyrul at a disadvantage.

Second leg: Swauger must have felt bad about Cyrul's penalty points because he pulled the same stunt at the start of the second leg and was awarded his very own 10-second penalty. Again, Spashett took the holeshot and got through turn one unscratched while the rest of the field scrabbled to find a line. He soon had a commanding lead, and his sights were on winning the second leg and yet another World Championship.

Meanwhile, Johnson was about 4 seconds behind Spashett, and Swauger and Hirosaka flanked Johnson to the rear. Hirosaka soon went around Swauger and was all over Johnson's back door within seconds. Spashett's lead continued to grow, but

Continued on page 102

COMMENTS from the PRINCIPAL SPONSORS

The IFMAR World Championships represents R/C car racing at its finest. The efforts of the organizers, racers and teams set standards by which other world events may be judged. The '98–'99 On-Road Worlds was no exception. It attracted the world's top racers, and its organization was truly topnotch. The racers competed fiercely yet displayed a sportsmanship that should be encouraged in all forms of racing. It wasn't unusual to see drivers pull their cars over after a bump with another car to let the other racer regain his position.

The event's highlight was the jam-packed ISTC World Cup touring-car race. The format encouraged teamwork and often had the crowds cheering. In my 20 years of R/C racing, I have never attended an event at which there was so much drama and team spirit. Also unique were the control tires and 12-turn motor limit. Both contributed to putting all the ISTC-class drivers on an equal footing and made the event very competitive.

HPI Racing and Team Orion were proud to be the event's principal sponsors, and special thanks also go to IFMAR and the BRCA. It was a huge undertaking to prepare a perfect racing facility and administer the schedule and rules with precision. We also thank all of the racers and teams for making the event a huge success.

—Kent Clausen, HPI Racing

DAVID SPASHETT SPEAKS OUT

VITAL SIGNS

Age: 22
Occupation: electrical engineer
Hometown: Eastbourne, England
Years racing: 14
First R/C car: Phantom (1/12-scale on-road)
Favorite class: 1/12-scale on-road
Favorite track: Apple Dome in Holland
Favorite race: 1994 1/12- and 1/10-scale World Championships in Paris, France
Sponsors: Trinity, TRC, Team Losi, LRP and KO Propo
Major wins: many times British and European champion and four-time IFMAR world champion.

I talked to the newly crowned IFMAR/ISTC World Champion directly after he walked off the drivers' stand after winning the second leg of the Pro 10—the victory that ultimately earned him his second world championship. Here's what he had to say.

R/C Car Action: Congratulations! You're the first racer to win every single class at a world championship; what's going through your mind right now?

David Spashett: I don't know ... nothing ... everything ... I guess I'm stressed out.

RCCA: That's understandable. How do you like this facility, the track and the event's overall organization?

DS: Pretty good actually. The BRCA did the Eurochamps in the same sort of manner as a warm-up for us Europeans, so they knew exactly what they had to do at this event. There weren't any problems like missing heats, and everything was well-announced and -organized, so it's been pretty good.

RCCA: How do you feel this World Championship rates against other world events?

DS: It's the best one I've ever attended.

RCCA: I'd say so! After all, you won big-time. Besides the competition, did you face any other obstacles?

DS: Not many. I only had to drive for eight hours to get here, which was great, but I had never raced touring cars on carpet, so I had to rely on what Gil Losi Jr. told me to do.

RCCA: Who were your toughest competitors in 1/12-scale?

DS: Josh Cyrul. I won the first Main, and he won the second, so the race wasn't decided until the final Main. Of course, Masami Hirosaka and Joel Johnson were also very good. Masami started out very badly, but toward the end, he was amazing—faster than everyone. His bad luck during qualifying placed him farther back on the grid—which he didn't deserve—and if he had been farther up on the grid, the outcome could have been completely different, wouldn't it?

RCCA: Let's talk touring cars. The competition was obviously fierce and it resembled an endurance race, so it must have been difficult to keep up with the pace. How did you like the racing format, and was there anything specific that you didn't like?

DS: I like the way we raced all the time and didn't have to worry about heat times too much until the end, when all the ties came into play and total laps and lap times were factored in. So that was just good fun—just being able to race against everybody. The only thing I didn't like was that the original idea was that you raced against everybody once or twice at the most. But I had to race Masami three times and Joel Johnson twice, but I didn't race Mike Blackstock, Josh Cyrul, or Rick Hohwart at all. So, in that respect, it wasn't that fair. The heat shuffling should have been done totally at random, and the most you should have had to race against anybody should have been twice. One of my friends had to race Masami five times, so it was nearly impossible for him to get good scores .

RCCA: What about the shuffling of the grid order? Some racers complained that it wasn't fair.

DS: I started with car number nine [ninth position] and on the first day, I raced a few times in that position. Because the grid order was changed frequently, I'd miss jumping up a position or two.... I started up toward the front on the grid only a few times on the second day. On the third and final day when the racing was critical, I missed the TQ spot and went straight to the back again. I mostly raced from the back because I raced a few times from the front of the grid on the previous day. Josh Cyrul had a similar situation. Toward the end of the event, we were always in the back when we should have been in the front, so we were just unlucky.

RCCA: Some drivers complained that certain independent competitors were just average club racers and that when racing the team drivers, their inexperience caused a few problems. Did you have any problems with back markers or some of the "rolling obstacles" that competed alongside you?

DS: A little bit, but I don't know .... They deserve to be here as much as anybody. Anyone could win. So they have a right to be in the same heat as us. For the most part, they move over to let you pass by, but the occasional one doesn't realize what's going on, and things happen fast, so you get hit.

RCCA: At what point did you feel that you had a really good shot at the overall championship?

DS: When I had seven wins, so I had the maximum 140 points, or whatever it was. It meant I'd be tied with several racers and total laps would have to be considered. I had one 19-lap win that I needed to replace with a 20-lap score to stay in the running. I ended up getting a 21-lap score that gave me an extra lap. After that, I knew if there were any further ties, I would still be ahead because of my extra lap. Then several other drivers finished with 21-lap scores, which tied things up again, and it came down to the last race. I had to beat Masami and Atsushi Hara in my last heat and do 21 laps at the same time.

RCCA: In the ISTC competition, the Manufacturers' Team points and the ISTC Championship would be decided during the final race. During that race, you, Atsushi Hara and Masami Hirosaka battled it out like Trojan warriors, but when going through one of the corners—Mo's Island—it seemed as if you rammed Atsushi Hara's car from behind, his car got out of shape, and you took the lead. For this, you were given a stop-and-go penalty. I'm sure you didn't ram Hara intentionally, but exactly what happened?

DS: We came down to the hairpin and I tried to take him from the inside, but I think he brake-checked me. I wasn't prepared for that and hit his car. He managed to carry on with no delays, while I had to come in for a stop-and-go penalty that slowed me down by nearly three seconds. I'm not an off-road racer, and I'm not used to hard braking. I usually set my brakes to the minimum, so when I hit full brake, there's hardly anything there to slow me down. I just couldn't slow down in time. But he got back out in front anyway, and it didn't affect his race. I later passed him again and carried on.

RCCA: How do you like having to use the control tires?

DS: It's good in a way because everyone is the same. It also stops the tire wars like when team drivers use a new set of tires for every run; this prevents the privateers from being competitive. Most privateers cannot afford to buy 20 sets of tires to remain competitive, whereas pro drivers can use as many as they need and don't have to pay for them. In that respect, the control tires were pretty good. We were allowed four sets of tires, and I only used three sets.

RCCA: Was it difficult to get dialed in on the carpet track?

DS: Chassis tweak was our only concern. We had to make sure that the car was completely flat. I mean, the grip came up so high that if your car was slightly tweaked, it would roll over in left and right turns. For that reason, we checked the tweak before every single run.

RCCA: Let's talk about the 1/10-scale competition; during the first leg, you and your teammate Josh Cyrul shot out in front and left the rest of the field to sort things out on their own. Josh followed you closely through every corner until you moved over and let him go. Did you do this because of the 10-second false-start penalty he was given for rolling his car a few inches forward before the start, or was he just pursuing you too closely so you let him pass by?

DS: He's a teammate, and I saw him jump at the start. He was following closely, so I just backed off and let him go. He had 10 seconds to make up, which was unfortunate.

RCCA: Thanks for clearing that up. Now, tell me why your teammates call you Austin Powers.

DS: The film came out in America when we were racing at the Nats in Cleveland, and a few of us went to see it. I guess it has to do with the accent; they say I talk like Austin Powers because of my British accent. I certainly don't dress like Austin Powers, though. Since then, I've started logging on to Trinity Online as Austin Powers.

RCCA: Has any particular driver influenced your racing career?

DS: When I started, Phil Davis was the British champion every year, and he was the guy to look up to. Then I looked up to Joel and Masami because they can drive anything anywhere extremely well.

RCCA: Thanks again for your time. I hope you find room in your house to display those three giant trophies!

ISTC CONTROL-TIRE CONCEPT IS GIVEN RAVE REVIEWS

IFMAR's ISTC organizer Peter Winton's original idea to use control tires in the ISTC competition was well received by all the drivers who competed. They tested several types of rubber tires to find a tire that would have plenty of bite on carpet and would wear well even when repeatedly treated with traction additive.

To test durability and overall strength, a tire was mounted on an electric drill bit and then pushed down, while rotating, onto a piece of carpet glued to a board. Sounds pretty rigorous! After weeks of testing various compounds and tread patterns on several touring cars, M1 T27 radial tires were selected.

These are the treaded radials sold in the USA by Parma*. Michael Yen from M1 arranged to have the tires molded with a unique "ISTC98" logo in the sidewall, and that made policing tire use much easier.

A driver was allowed to use a maximum four sets of tires. When drivers had mounted the tires on their wheels, officials placed a red rubber seal on the tire's mounting bead and assigned the tire an ID number.

Drivers decided how and when to use each tire, and on talking to several, I found that many admitted that they used only three of the four tire sets they had been allocated.

The M1 T27 radials included foam inserts, but any type of insert was allowed, and the tire-insert choices of various independent and team drivers soon became the most closely guarded secrets at the Worlds.

The idea of allowing only one type of tire turned out to be so successful that control tires will be used at all future IFMAR touring-car meets. Tires are among the most expensive items on the racer's shopping list, and having to buy a dozen or more sets just to be competitive has little appeal to most racers. Providing racers with control tires reduces the cost of competing dramatically and makes events fairer because everyone uses the same treads. Our hats are off to IFMAR for making such a sound decision and to the folks at M1 for producing the reliable rubber.

Continued from page 99

Johnson and Hirosaka still had to battle for second, and three drivers vied for fourth.

With less than 20 seconds left, Hirosaka blew past Johnson on the straightaway to claim second; Johnson's car started to slow down—a sign that his batteries were going flat; Spashett crossed the line first to easily win the second leg and the world championship; Hirosaka crossed in second place; and Johnson only barely took third. Although Spashett was declared the 1/10-scale World Champ, second and third were still up for grabs.

We couldn't find a camera small enough to fit inside a touring car, so we mounted a standard-size VHS "C" unit on one of them. The car was still surprisingly stable with the onboard camera. OK; it was a pig, but it provided some cool images.

Third leg: even though Spashett already had the championship and did not have to compete in this final leg, he raced just for the fun of it. Hey; when in Rome .... Who shot out in front and never once looked back throughout the entire race? Well, this previously unknown driver from Britain who wears a Team Trinity T-shirt did exactly that—and for the third time in a row, no less.

Cyrul claimed second early on, while teammate Johnson followed close behind in third. With 3 minutes down, Johnson successfully passed Cyrul to claim second, and Cyrul found himself in a little cluster with Andrew Moore and Tony Neisinger. Moments after that, going through one of the corners, Cyrul was taken out and thrown to the back of the pack. Just before the buzzer sounded, Spashett crossed the line to take a victory lap, and Johnson strolled in to claim second. Moore crossed the line a few seconds later in third, and Orr and Neisinger followed in fourth and fifth, respectively.

At a party for competitors, a band played "Queen" covers and the place rocked.

We all knew that Spashett had won the championship, but nobody had a clue who had taken second and third. When the points had been tallied, Joel Johnson was in second and Jon Orr had secured third.

FINAL THOUGHTS

The '98–'99 IFMAR 1/12 and 1/10-Scale Electric On-Road World Championships was one of the best races in IFMAR history. It's also the only IFMAR world championship in which every event was won by the same driver.

Worlds action via the Internet

If you clicked on the IFMAR link on the *R/C Car Action* website, you no doubt enjoyed the coverage of the IFMAR Electric World Championships by the British Radio Control Association (BRCA). The site was updated daily and included some rather colorful commentary. If you took advantage of this service, up-to-the-minute race results, new product information, interviews with R/C celebrities and hundreds of digital images that captured all the fun and excitement of the event were just a click away.

Managing and maintaining the IFMAR site was a major undertaking that involved two computers, three digital cameras, a scanner and the hard work and dedication of BRCA volunteers Peter Winton, Graham Casey and Neil Mead.

The site was up several weeks before the event to publish travel information for those who had planned to travel to the Worlds. This invaluable information helped participants to make flight plans, book hotels and learn about the sights and entertainment they might find in South Shields. The site also showed the race schedule and the IFMAR rules pertaining to the 1/12- and 1/10-scale and ISTC World Cup competitions.

We salute the BRCA and all those involved for providing such a great service and for letting us link the *R/C Car Action* site with it!

The men behind the "On Track '98" website (left to right): Graham Casey, Neil Mead and Peter Winton.

FINAL RESULTS

1/12 scale

FIN.	QUAL.	DRIVER	CHASSIS	MOTOR	BATTERY	ESC	RADIO	BODY	TIRES
1.	1	David Spashett	Trinity 22.2J	Trinity 13x3	Trinity	LRP Quantum	KO Vantage	Protoform Nissan	TRC
2.	6	Jon Orr	Associated RC12L3	GM 14x4	GM VIS	GM V12	Airtronics 3PS	Protoform Nissan	Jaco
3.	4	Masami Hirosaka	Associated RC12L3	Reedy 16x3	Yokomo	Tekin G9 M-Star Red	KO Vantage	Protoform Nissan	Jaco
4.	5	Joel Johnson	Trinity Switchblade 12SJ*	Trinity 14x2	Trinity	Novak Atom	Airtronics M-8	Andy's Mercedes	TRC
5.	2	Josh Cyrul	Trinity Switchblade 12SJ*	Trinity 14x2 D3	Trinity	Novak Atom	JR R-1	Protoform Nissan	TRC
6.	7	Oscar Jansen	Associated RC12L3	Orion 15x3	Orion	LRP Quantum	KO Vantage	Hot Bodies Ferrari	Jaco
7.	9	Andy Griffiths	Trinity 22.2J	AGR 16x3	Trinity	GM V12	JR X756	Hot Bodies Nissan	TRC
8.	3	Barry Baker	Associated RC12L3	Maxtec 16x1	Maxtec	LRP Quantum	Airtronics M-8	Protoform Nissan/Andy's Mercedes	Jaco
9.	8	Craig Drescher	Associated RC12L3	Reedy 16x3	Reedy/Orion	LRP Quantum	KO Vantage	Andy's Mercedes	Jaco
10.	10	Michael Swauger	Associated RC12L3	Reedy 14x3	Reedy/Orion	LRP Quantum	Airtronics M-8	Andy's Mercedes	Jaco

* = with Trinity 22.2J front end

Pro 1/10 scale

FIN.	QUAL.	DRIVER	CHASSIS	MOTOR	BATTERY	ESC	RADIO	BODY	TIRES
1.	1	David Spashett	Trinity Switchblade	Trinity 12 double	Trinity	LRP Quantum	KO Vantage	Andy's Sauber Mercedes	TRC
2.	5	Joel Johnson	Trinity Switchblade	Trinity 12 Quad D3	Trinity	Novak Cyclone	Airtronics M-8	Andy's Sauber Mercedes	TRC
3.	6	Jon Orr	Associated 10L2	GM 11 Triple	GM VIS	GM-12	Airtronics 3PS	Andy's Sauber Mercedes	Jaco
4.	8	Masami Hirosaka	Yokomo YRX-98	Reedy 13 Triple	Yokomo Plus2	Tekin G-10	KO Vantage	Protoform Nissan P-35	Jaco
5.	4	Michael Swauger	Yokomo YRX-98	Reedy 12 double	Reedy/Orion	LRP Quantum	Airtronics M-8	Andy's Sauber Mercedes	Jaco
6.	10	Andrew Moore	Corally C10-X	Corally 12 double	Orion	LRP Quantum	KO Vantage	Protoform Nissan P-35	Corally Gold
7.	7	Craig Drescher	Associated 10L2	Reedy 12 Triple	Reedy/Orion	LRP Quantum	KO Vantage	Andy's Sauber Mercedes	Jaco
8.	9	Tony Neisinger	Associated 10L2	Reedy 12 double	Reedy/Orion	Tekin G-10	Airtronics 3PS	Andy's Sauber Mercedes	BSR
9.	3	Josh Cyrul	Trinity Switchblade	Trinity 12x6	Trinity	Novak Cyclone	JR R-1	Andy's Sauber Mercedes	TRC
10.	2	Michael Blackstock	Trinity Switchblade	Trinity 12 double	Trinity	Novak Cyclone	JR R-1	Andy's Sauber Mercedes	TRC

ISTC Top 10 Manufacturer Teams

FIN.	DRIVER	CHASSIS	MOTOR	BATTERY	ESC	RADIO	BODY	PINION/SPUR RATIOS
1.	David Spashett	Losi Street Weapon	Trinity 12 Quad	Trinity	LRP Quantum	KO Vantage	Andy's Dodge Stratus	23/82
2.	Josh Cyrul	Losi Street Weapon	Trinity 12 Triple	Trinity	Novak Cyclone	JR R-1	Andy's Dodge Stratus	23/82
3.	Joel Johnson	Losi Street Weapon	Trinity 12 Triple D3	Trinity	Novak Cyclone	Airtronics M-8	Andy's Dodge Stratus	23/82
4.	Masami Hirosaka	Yokomo YR-4M2	Reedy 12 Triple	Yokomo Plus2	Tekin M-Star Touring	KO Vantage	Andy's Dodge Stratus	21/78
5.	Barry Baker	Yokomo YR-4M2	Maxtec 12 Triple	Maxtec	LRP Quantum	Airtronics M-8	Protoform Nissan Primera	24/84
6.	Michael Blackstock	Losi Street Weapon	Trinity 12 Triple D3	Trinity	Novak Cyclone	JR R-1	Andy's Dodge Stratus	22/82
7.	Greg Hodapp	Yokomo YR-4M2	Maxtec 12 Triple	Maxtec	Tekin G-9	Airtronics M-8	Andy's Dodge Stratus	22/81
8.	Mike Swauger	Yokomo YR-4M2	Reedy 12 double	Reedy/Orion	LRP Quantum	Sanwa M-8	Andy's Dodge Stratus	30/104
9.	Craig Drescher	Yokomo YR-4M2	Reedy 12 Quad	Reedy/Orion	LRP Quantum	KO Vantage	Andy's Dodge Stratus	22/84
10.	Rick Hohwart	Losi Street Weapon	Peak 12 Triple D3	Peak PowerFlo	Novak Cyclone	Futaba 3PJ	Andy's Dodge Stratus	23/84

ISTC Manufacturer Team World Cup final scores

POS.	TEAM	TOTAL	DRIVER 1	DRIVER 2	DRIVER 3	DRIVER 4
1.	Losi	560	140	140	140	140
2.	Yokomo	554	140	140	137	137
3.	HPI	511	134	128	128	121
4.	Schumacher	491	134	126	125	106
5.	HPI Europe	467	123	115	115	114
6.	Kyosho	459	124	116	115	104
7.	GM	423	123	101	101	98
8.	Corally	414	118	105	98	93
9.	Xpress	411	119	102	95	95
10.	M1	377	103	95	94	85

After 156 races, the scores were added to decide which team would become the inaugural IFMAR International Scale Touring Car (ISTC) World Cup Champion Manufacturer. The total scores for the top four drivers in each team were combined to determine the winner.

The folks from the British Radio Control Association (BRCA) and IFMAR have a truly first-rate venue, and all who participated had a great time. The beauty of South Shields and the nearby English coast and countryside made it even more enjoyable, and we all appreciated the North of England's renowned hospitality. I'm sure that all those who traveled from far away took many fond memories home with them.

The ISTC competition was extremely exciting and provided nonstop action. Maybe IFMAR will now hold a world championship just for touring cars.

We thank the principal sponsors, HPI Racing and Team Orion, for their generous support and we congratulate David Spashett, Team Trinity and Team Losi for their fantastic accomplishments. See you next time ....

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

Team Trinity's David Spashett took all of the titles up for grabs at the IFMAR 1/12- and 1/10-scale Electric On-Road Worlds—a feat matched by no other. Even more amazing is that he won with cars that were basically box stock. We have to admit, however, that Spashett's Team Losi Street Weapon is pretty hopped-up, but only with commercially available aftermarket parts—no prototype, machined parts.

If you're wondering how the champ set up his vehicles to win against a field of the world's most talented drivers—many driving cars that had been specially designed for racing on carpet—read on. But don't be disappointed when you discover that David's setups represent little more than good sense; if you want to drive as well as he does, the secret is practice!

IFMAR WORLD CHAM

'98 Winning

SPASHETT'S 1/10-SCALE
TRINITY SWITCHBLADE 10

HOP-UPS

Trinity Stealth II diff assembly—part no. TM1203.
Lightweight purple screw set—SB5078.
Lightweight axle hubs (L/R)—M1207/TM1209

OTHER CHANGES

Body: Andy's Mercedes
Traction compound: Spashett's Tangerine Tire Tack
Motor: Trinity D2 12-turn double (Trinity's newer D3 would have been too powerful; Trinity's new D3.5—the company's most efficient motor, could not be used because it was deemed too new to be raced at the Worlds)
Pinion/spur gear: 23/120
ESC: LRP Quantum
Radio: KO Propo
Batteries: Trinity VIS EX-tra Team Cells

FRONT END

Caster: 3 degrees
Camber: 1.5 degrees
Toe-in/out: 1 degree (out)
Active caster: no
Axles: stock trailing
Springs (L/R): stock 0.020
Damping: Trinity Purple Stuff
Roll center: medium-size ball studs (medium setting)
Ride height: 4mm
Tires: TRC Purple

SPECIAL MODIFICATIONS

Rear axle hubs were machined to reduce weight
David used the older Evolution 10 upper arms with the stock Switchblade plastic bottom arms

REAR END

Center shock: Trinity 40WT silicone fluid; stock medium spring
Side shocks: Trinity 30WT silicone fluid; 0.030 springs
T-plate: stock pivot balls
Ride height: 4mm
Tires: TRC Gray

PHOTOS BY WALTER SIDAS

TUNE 'EM LIKE THE PRO'S

ONSHIP

Cars

SPASHETT'S

TEAM LOSI STREET WEAPON

by George M. Gonzalez

FRONT END

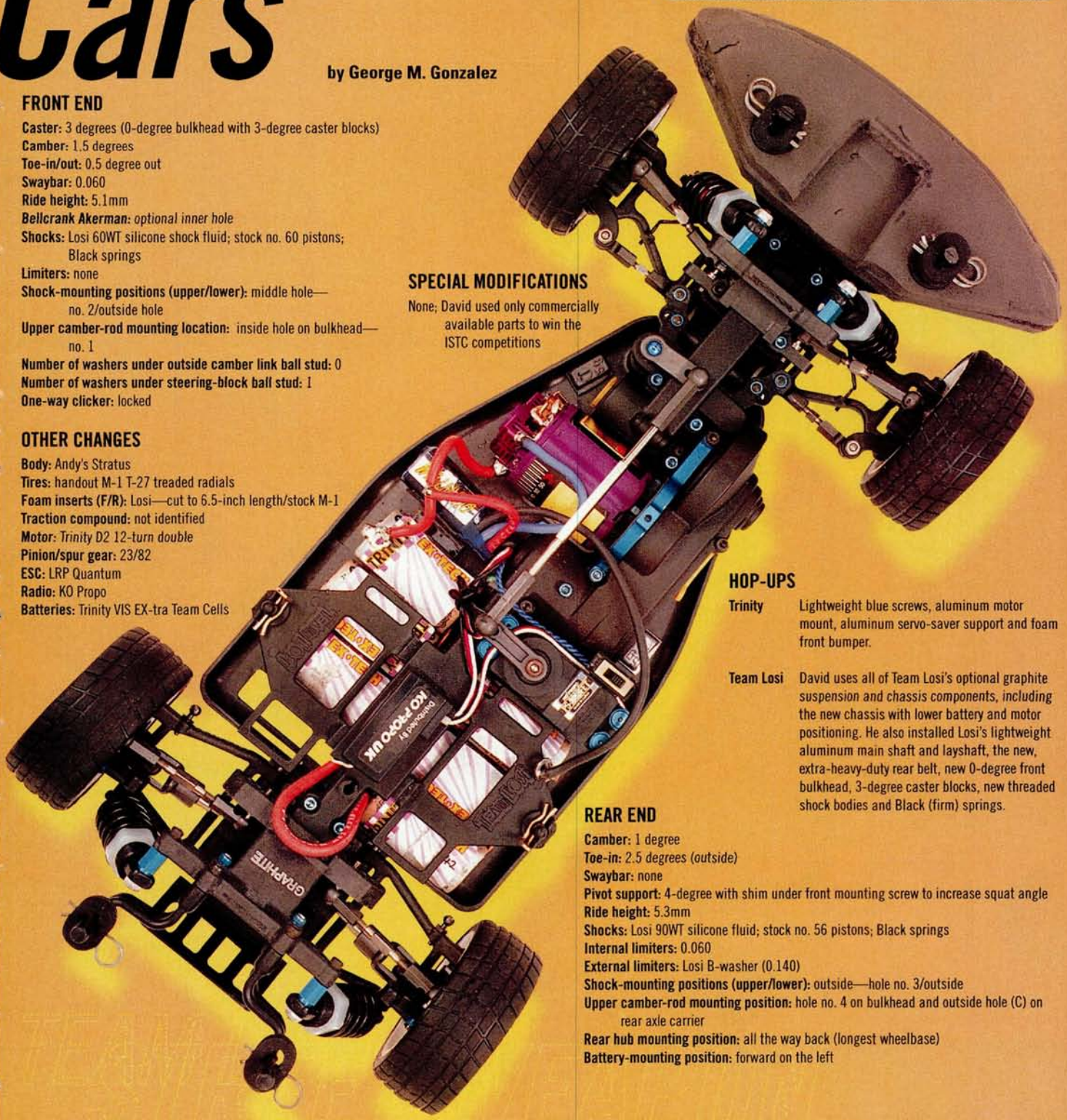
Caster: 3 degrees (0-degree bulkhead with 3-degree caster blocks)
Camber: 1.5 degrees
Toe-in/out: 0.5 degree out
Swaybar: 0.060
Ride height: 5.1mm
Bellcrank Akerman: *optional inner hole*
Shocks: Losi 60WT silicone shock fluid; stock no. 60 pistons; Black springs
Limiters: none
Shock-mounting positions (upper/lower): middle hole—no. 2/outside hole
Upper camber-rod mounting location: inside hole on bulkhead—no. 1
Number of washers under outside camber link ball stud: 0
Number of washers under steering-block ball stud: 1
One-way clicker: locked

SPECIAL MODIFICATIONS

None; David used only commercially available parts to win the ISTC competitions

OTHER CHANGES

Body: Andy's Stratus
Tires: handout M-1 T-27 treaded radials
Foam inserts (F/R): Losi—cut to 6.5-inch length/stock M-1
Traction compound: not identified
Motor: *Trinity D2 12-turn double*
Pinion/spur gear: 23/82
ESC: LRP Quantum
Radio: KO Propo
Batteries: Trinity VIS EX-tra Team Cells



HOP-UPS

Trinity Lightweight blue screws, aluminum motor mount, aluminum servo-saver support and foam front bumper.

Team Losi David uses all of Team Losi's optional graphite suspension and chassis components, including the new chassis with lower battery and motor positioning. He also installed Losi's lightweight aluminum main shaft and layshaft, the new, extra-heavy-duty rear belt, new 0-degree front bulkhead, 3-degree caster blocks, new threaded shock bodies and Black (firm) springs.

REAR END

Camber: 1 degree
Toe-in: 2.5 degrees (outside)
Swaybar: none
Pivot support: 4-degree with shim under front mounting screw to increase squat angle
Ride height: 5.3mm
Shocks: Losi 90WT silicone fluid; stock no. 56 pistons; Black springs
Internal limiters: 0.060
External limiters: Losi B-washer (0.140)
Shock-mounting positions (upper/lower): outside—hole no. 3/outside
Upper camber-rod mounting position: hole no. 4 on bulkhead and outside hole (C) on rear axle carrier
Rear hub mounting position: all the way back (longest wheelbase)
Battery-mounting position: forward on the left

SPASHETT'S 1/12-SCALE
TRINITY REVOLVER 22

IS THIS A GREAT SPORT OR WHAT?

While checking out David Spashett's cars, I couldn't help but think how cool the sport of R/C racing is. In no other form of racing can we ordinary mortals drive, own and compete with the same equipment as the reigning world champ. Without a major lottery windfall, could you ever duplicate Michael Schumacher's factory Ferrari—and then sign up for a race on Sunday (not to mention run it in your driveway!)? Hardly. But if you want to race David's setup, the biggest hassle will be the traffic on the way to the hobby shop.

FRONT END

Caster: 6 degrees
Camber: 1 degree
Toe-in/out: 0 degrees
Active caster: yes
Axles: in-line
Springs: Trinity 0.020
Damping: Trinity Purple Stuff
Roll center: small ball studs (low setting)
Ride height: 3mm
Tires: TRC Purple

HOP-UPS

Trinity Stealth II diff assembly
Lightweight purple screw set
Lightweight axle hubs

OTHER CHANGES

Body: Andy's Mercedes
Traction compound: Spashett's Tangerine Tire Tack
Motor: Trinity D2 14-turn triple
Pinion/spur gear: 22/100
ESC: LRP Quantum
Radio: KO Propo
Batteries: Trinity VIS EX-tra Team Cells

SPECIAL MODIFICATION

Rear axle hubs were machined to reduce weight

REAR END

Center shock: Trinity 40WT fluid
Side damper tube: Trinity medium silicone—RC6009
T-plate: 0.063 inch (thin)
Ride height: 3mm
Roll center: stock setting (stock pivot balls)
Tires: TRC Gray

The addresses of the companies mentioned here are listed alphabetically in the Index of Manufacturers on page 225. ■

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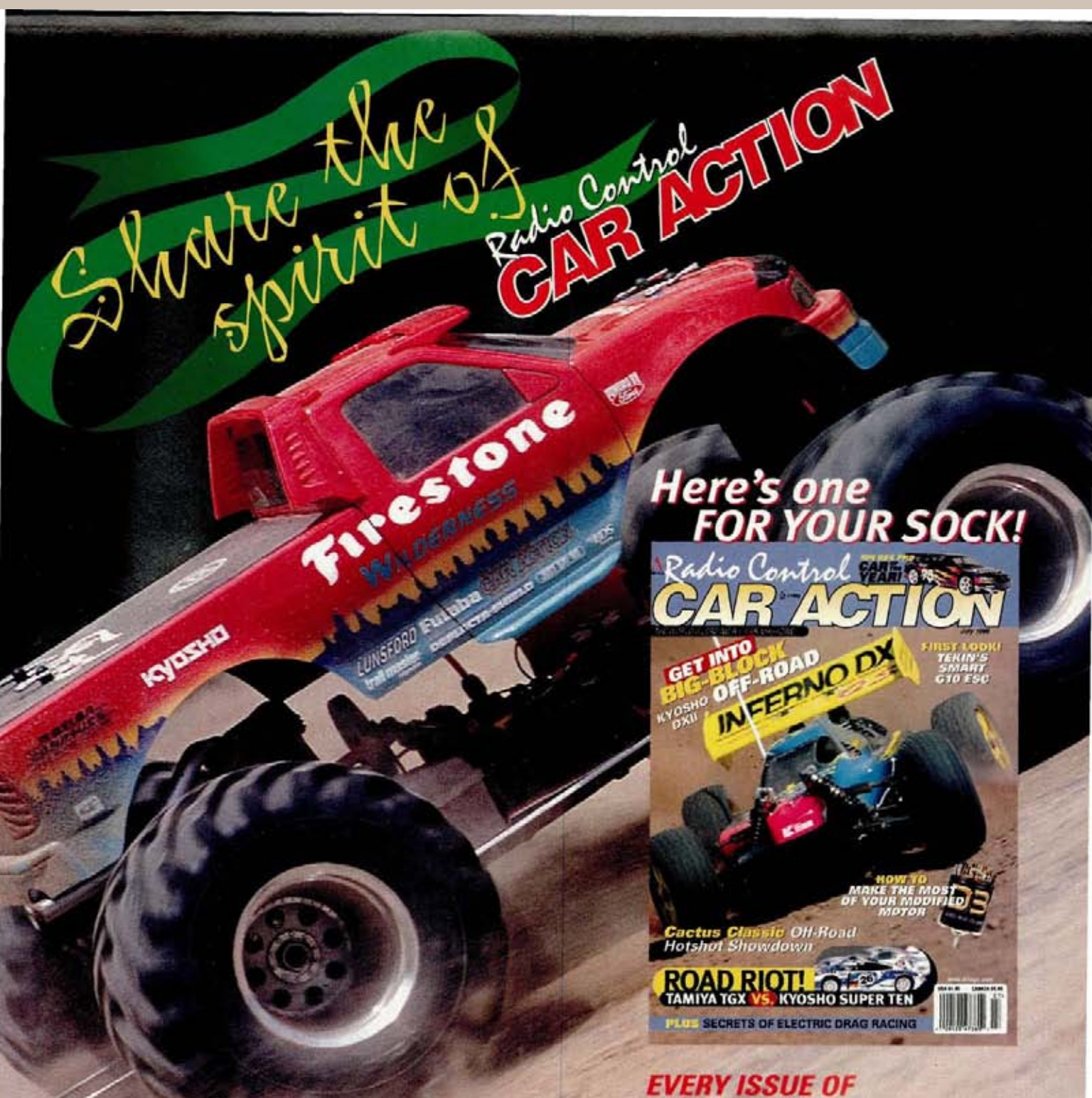

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BUDGET RA

CALLING ALL

MANY MANUFACTURING companies have a flagship product—something that dazzles with its technical innovation, breakthrough styling and cutting-edge performance. Chevrolet has the Corvette; Dodge has the Viper; Ford has the Cobra Mustang .... You get the picture. These cars aren't built to generate a ton of money for their makers; they are simply showcases that let the world know each company has what it takes to make the best.

Manufacturers of R/C systems are no different; the Futaba 3PJ and JR Racing R-1, Airtronics M8 and KO Mars are top-of-the-line, no-holds-barred products. They were designed to be the most advanced in the world and also to attract attention to their manufacturers' bread-and-butter systems; you know—the ones most of us can afford. The key question is, just how much of that cutting-edge technology filters down to mainstream systems, and at what cost?

Here we list what we consider to be "budget" radio systems—radio systems for those on a budget. We take a close look at the most basic entry-level radios and models with slightly more features.

We narrowed the field to systems with a street price of $125 or less, and we explain the applications and benefits of the more common features and describe the unique differences that could be deciding factors for you. Before you break that piggy bank, dig in and figure out which radio system is best for you!

AIRTRONICS

XL2P

The XL2P is easily reversed to suit left-handed drivers.

Many R/C enthusiasts will recognize the XL2P, given its long history. It seems to have been around forever—a testament to good design—and is loaded with features: analog meter to display battery life; reversible grip for left- and right-handed use; and loads of trim functions, including throttle EPA and dual-rate steering. All adjustments are easily accessible, and a hidden thumb switch can be used to instantly initiate full brake.

GLOSSARY OF TERMS

Adjustable travel volume (ATV)/servo endpoint adjustment (EPA): generally preceded by "throttle" or "steering" to indicate the channel that is being adjusted. This setting determines the servo's total travel range from full left to full right. With this function, left and right throws can be adjusted independently—especially useful when setting up throttle linkages for gas vehicles.

Battery alarm: sounds when the radio's battery voltage falls below its requirements for reliable operation.

Battery meter: indicates the transmitter batteries' charge status; LED meters use three or more LED lamps that go out or flash as power drops; analog meters have a needle gauge that shows battery level.

Charging jack: allows Ni-Cd batteries to be charged in the transmitter.

Dual rate: allows servo throw to be adjusted equally from left to right.

Left-hand-adaptable: transmitters with this feature can be configured with the wheel on the left side for southpaw use.

Model memory: very helpful; allows the radio to store your custom settings for several models. This eliminates the need to tediously reprogram when you move the radio between vehicles.

Servo-reversing: the switch that will reverse the servo to its normal operation if throttle or steering movement is in a direction that's opposite to the one intended.

Steering/throttle trim: allows the steering and throttle servos to be centered, or "trimmed," from the radio.

Throttle-trigger adjustment: allows you to change the throttle trigger's position.

Wheel tension: a mechanical adjustment of the force required to operate the steering wheel.

DIO GUIDE

CARS!

by THE STAFF OF R/C CAR ACTION

Rival 2P

The Rivals are similar in shape and style and differ only in a few cosmetic and adjustment features. The basic model, the Sport, is easily identified by its black steering wheel. Its hidden servo-reversing switches and antenna contribute to its clean look, and with their ratchet feel, its trim knobs are easy to manipulate. If you're looking for something a little more adjustable, the Rival 2P would be a good choice. It has convenient features such as dual-rate steering and an audio alarm to indicate low battery power.

The Rivals' adjustment knobs are close to the steering wheel, so you can adjust them easily while you're running your car.

Rival Sport

DIFFERENT STROKES FOR DIFFERENT FOLKS

If you run more than one car, you already know that cars have differing needs with respect to radio features. That's why all the transmitters in this guide are available with a variety of electronics—a single standard servo or two standard servos; an electronic speed control (ESC) or an ESC and a premium servo, etc.

How do you know what you need for your car? It isn't hard to decide. Though there's a wide variety of R/C vehicles out there, they all fit into basic categories that have the same requirements, regardless of manufacturer. Just match your car to the category.

■ **Competition buggies and trucks.** A standard servo will steer a buggy reasonably well, but a faster/stronger servo is best for racing. A standard servo is fine for fun-running and occasional races. Keep in mind that the ESCs included with most budget radios have reverse and are generally not legal for racing.

■ **Monster trucks.** We're really just talking about two vehicles here: the Kyosho USA-1 and Tamiya Clod Buster. Both feature 4WD and four-wheel steering, and that requires a lot of torque. A "standard" servo just won't do it; you'll need a high-torque servo to steer these monsters. Both trucks have mechanical speed controls (MSC) that can be operated with a standard servo, but if you can swing the extra bucks, go for an ESC. You'll have more control, and that's more fun.

Continued on page 120

FUTABA

Magnum 2PCKA

The Magnums' clean lines resemble Futaba's top-end 3P units.

Comfortable grips, rubber steering wheels and roomy triggers make both Magnums very comfortable on the stand. The 2PC version includes trim adjustments and servo-reversing for both channels, while the 2PCKA adds steering dual rate and throttle ATV (more commonly referred to as "EPA," or endpoint adjustment) to tune the throttle servos on gas cars more effectively.

Magnum 2PC

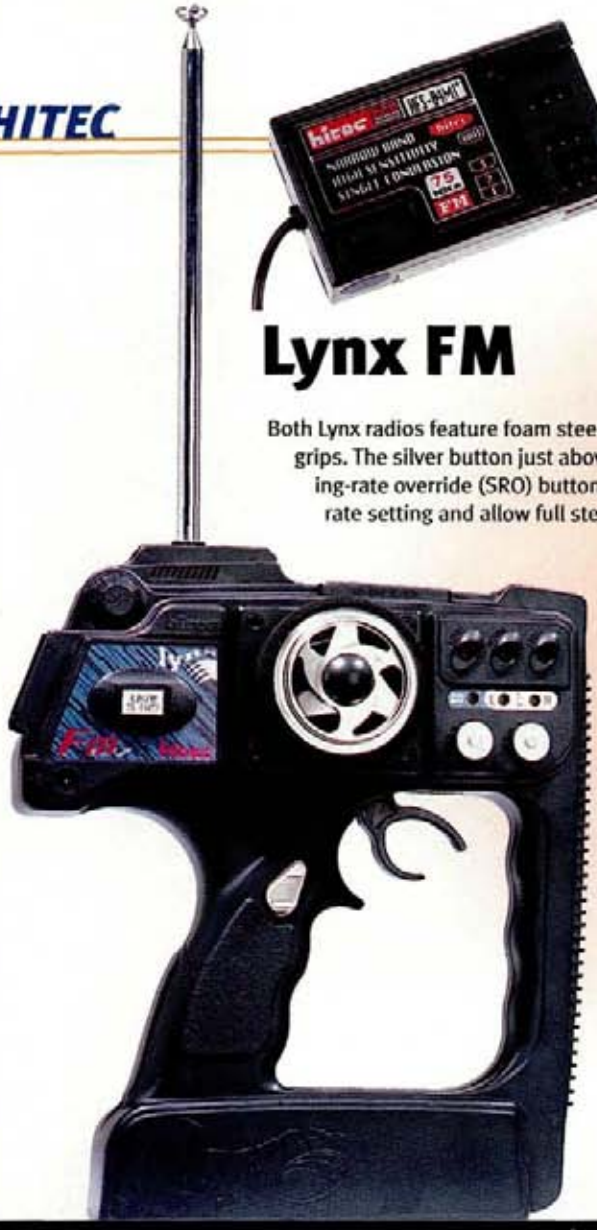
Both Futaba radios have bright LED displays to indicate the batteries' power level.

PRODUCT COMPARISON CHART

MANUFACTURER	AIRTRONICS			FUTABA	
FEATURES	Rival Sport	Rival 2P	XL2P	2PC	2PCKA
Throttle ATV/EPA	–	–	√	–	√
Model memory	–	–	–	–	–
Steering trim	√	√	√	√	√
Throttle trim	√	√	√	√	√
Battery alarm	–	√	–	√	√
Wheel-tension adjustment	–	–	√	–	–
Left-hand adaptable	–	–	√	–	–
Throttle-trigger adjustment	√	√	–	–	–
Servo-reversing	√	√	√	√	√
Battery meter	LED	LED	Analog	LED	LED
Dual-rate steering	–	√	√	–	√
Ni-Cd charging jack	√	√	√	–	√
Receiver dimensions (in.)	1.54x0.79x1.42	1.54x0.79x1.42	1.9x1.2x0.75	1.86x1.31x0.68	1.86x1.31x0.68
Weight (oz.)	1.59	1.59	1 (w/crystal)	0.59	0.59
Warranty	1 year	1 year	1 year	1 year	1 year
List price	$105.95	$105.95	$169.95	$134.95	$179.95
Street price	$64.99	$72.99	$99.99	$68.99	$86.99

HITEC

Lynx FM



Both Lynx radios feature foam steering wheels and contoured grips. The silver button just above the center of the grip is the steering-rate override (SRO) button; when pressed, it will override the dual-rate setting and allow full steering throw—very handy for getting off the boards and around a crash. Both have steering and throttle trims, servo-reversing and charging jacks. The Lynx FM also has throttle EPA, which is useful for setting the throttle linkages in gas cars. Of course, its most significant feature is FM operation for greater signal clarity and range.

Lynx

HITEC		JR RACING		TOWER HOBBIES	TRAXXAS
Lynx	Lynx FM	Python	XR2	System 3000 2TW	Top Qualifier
–	√	–	√	√	–
–	–	–	2	–	–
√	√	√	√	√	√
√	√	√	√	√	√
–	–	–	√	–	–
–	–	–	√	–	–
–	–	–	–	–	–
–	–	–	–	√	√
√	√	√	√	√	√
LED	LED	Analog	LCD	Analog	LED
√	√	√	√	–	–
√	√	√	√	–	–
1.2x1.9x0.7	1.2x1.9x0.7	1.93x1.5x0.827	1.26x1.76x0.87	1.87x1.24x0.62	2.25x1.37x0.75
0.9	0.75	1.3	0.88	0.59	1.3
1 year	1 year	1 year	1 year	1 year	30 days
$99.95	$149.95	$99.95	$159.95	$52.98	$95
$62.99	$104.99	$69.95	$119.95	NA	$64.99

Continued from page 117

DIFFERENT STROKES FOR DIFFERENT FOLKS

■ Touring cars and minis. A standard servo will steer these cars, and kits equipped with an MSC can be operated with a standard servo; but once again, an ESC is a nice upgrade. Most touring cars actually require an ESC, as they don't have any provisions for a mechanical unit.

■ "Sport" buggies and trucks. These vehicles tend to include MSCs and don't place heavy demands on servos; a pair of standard servos will do the job.

■ 1/10- and 1/12-scale pan cars. These high-performance cars must use an ESC, but if you plan to race, you'll be better off if you buy the ESC separately. A standard servo will work for steering, but performance will be much improved with a faster mini-servo; many 1/12 cars must use a mini-servo because they have limited chassis space.

■ Nitro-powered vehicles. You'll need two servos—one for the throttle/brake and one for steering. A standard servo is adequate for throttle and brake on most gas cars, but you should base your steering-servo decisions on the type of nitro-powered vehicle you run (see the categories discussed here).

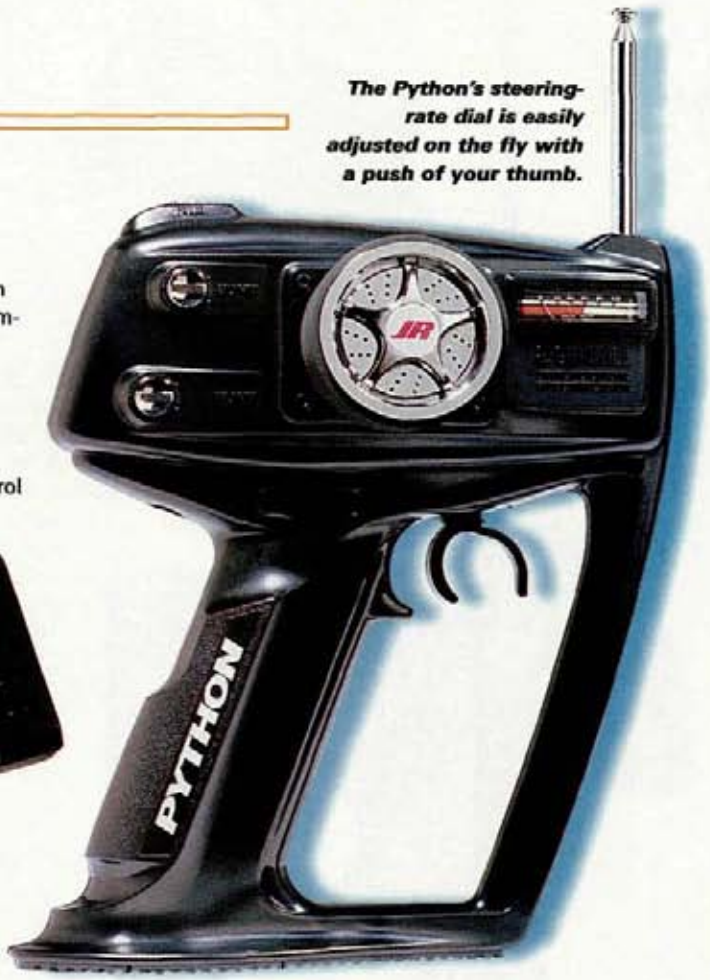
■ Getting what you need. One of the best reasons to buy from your local hobby shop is flexibility; many shops will allow you to swap a radio's standard servo or ESC for a better unit, just for the difference in price. This allows you to create a custom radio without paying for extra equipment you don't need. Ask before you buy!

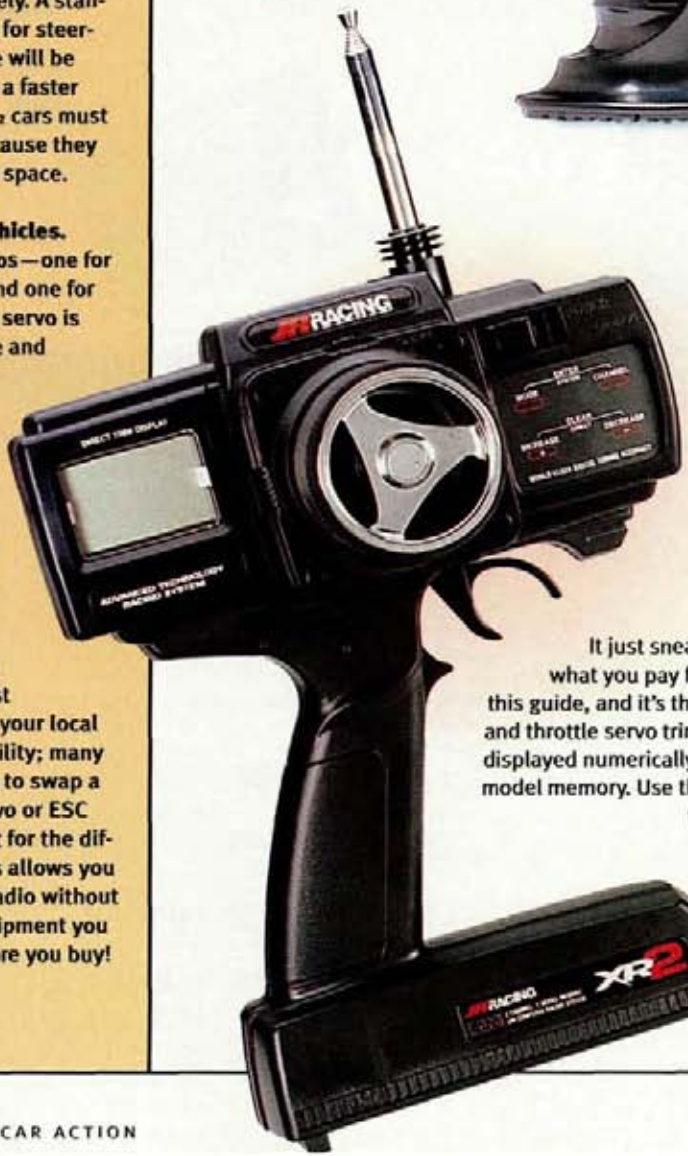
JR RACING

The Python's steering-rate dial is easily adjusted on the fly with a push of your thumb.

Python

The smoothly contoured Python has an aggressive look and palm-filling handle. Basic features, including servo-reversing and trims for steering and throttle, allow easy setup in any vehicle, and steering dual rate offers an extra measure of control and adjustability.





XR2

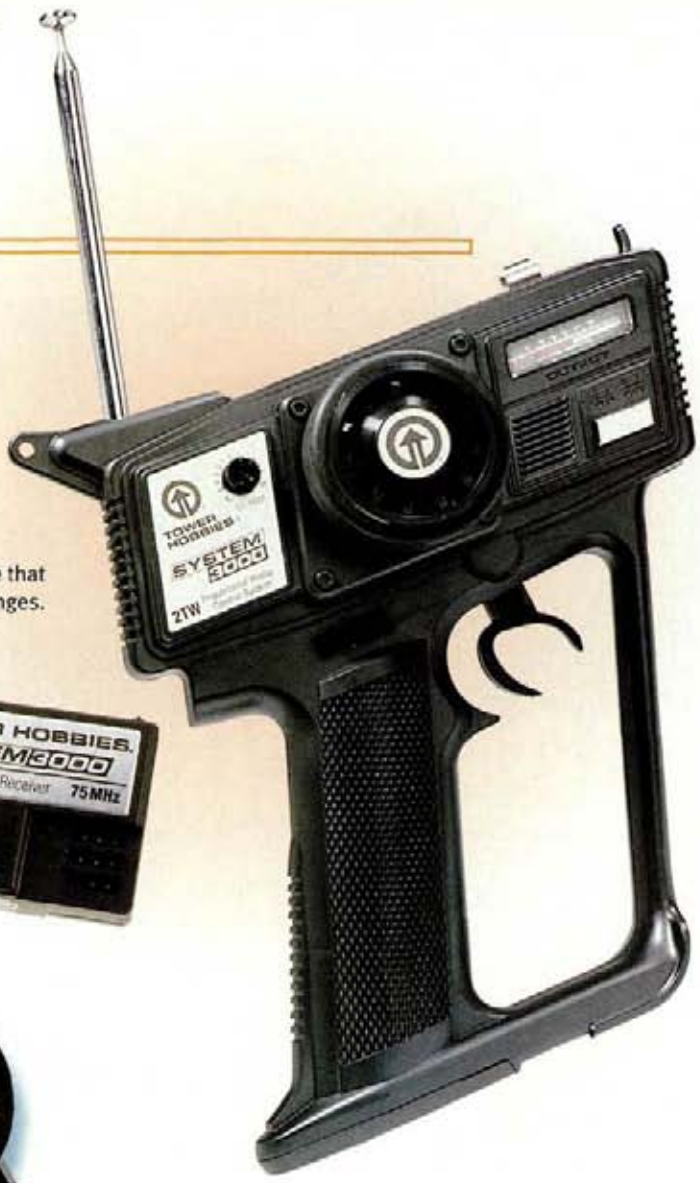
It just sneaks in under the "budget" price cap, but you get what you pay for: the XR2 is the most feature-packed radio in this guide, and it's the only one to include an LCD display. Steering and throttle servo trim, steering dual rate and throttle endpoints are displayed numerically, and the settings may be stored in the unit's two-model memory. Use the membrane keypad to cycle through and change the adjustable functions, or operate any trim lever to automatically call up its current value on the screen.

The XR2 has a two-model memory—a real plus for drivers who need to switch one radio between cars.

TOWER HOBBIES

System 3000 2TW

The Tower radio has a rugged, durable design and all the basic features required to get an R/C car up and running. An analog meter displays battery condition, and throttle and steering trims are easy to adjust. The antenna clips to the top for storage, and the batteries are loaded into a cartridge that slides into the transmitter handle for quick pack changes.



Tower's bulletproof radio can take a lot of abuse; the components are well-protected against impact damage.

TRAXXAS

Top Qualifier

This distinctive radio looks like no other. Its contoured grip features a wide thumb rest, and its compact "head" features large steering- and throttle-trim knobs and a switch that allows the user to select 70/30 or 50/50 trigger throw. Unlike those on most other radios, its large, padded steering wheel is in front of the trigger. A single LED glows when the transmitter is on and flashes to indicate when the batteries are low.

The unique Traxxas style definitely stands out from the rest. If you want to be different, this is the way to go.

The addresses of the companies featured in this Radio Guide are listed alphabetically in the Index of Manufacturers on page 225.

Project RC10GT

by Steve Pond

OUR DRIVE to maximize the performance of our R/C vehicles results in millions of dollars of aftermarket sales each year. It doesn't matter what we run; those who have competition in their blood want to have the fastest, trickest and best handling of the breed.

For some time, the RC10GT truck has been a dominant force in 1/10 nitro racing. Both in numbers and by performance prowess, it dominates the winners' charts at most events. Having an Associated RC10GT will keep you competitive, but just as you have one, so do many others, and you know what that means! It means you need to make sure that yours is the best RC10GT on the track.*

The information given here was drawn not just from my experience with the truck, but also from some of the top people in the business, including Cliff Lett, Gene and Curtiss Hustings of Team Associated, Steve O'Donnell of O'Donnell Racing, Ron Paris of Paris Racing and Richard Saxton, the current 1/10 nitro truck national champion.

The bottom line is this: if you follow the setup and modification advice given here, you'll have a pro-caliber GT that's competitive at the highest levels.

The fastest RC10GT in the world?

Alternative Power

Thunder Tiger Pro 12 BX (AP)

Until I started to work on my Project RC10GT, most of my experience with it had been with the O.S. 12 CV and CZ engines—both very successful in racing circles. When I sat down to rebuild the GT for this article, I noticed that the CV engine, which I had previously used for racing, had a bad front crank bearing. Without a fresh replacement bearing, I was without an engine. Fortunately, on my workshop shelf was a Thunder Tiger Pro 12 BX (AP), which was designed for the GT.

As a racer, I tend to stick with what works and am reluctant to try new equipment (if it ain't broke, don't fix it!). I had heard good things about the Pro 12, so I figured I'd give it a shot. Its specifications are virtually identical to those of the O.S. CZ-Z engine.

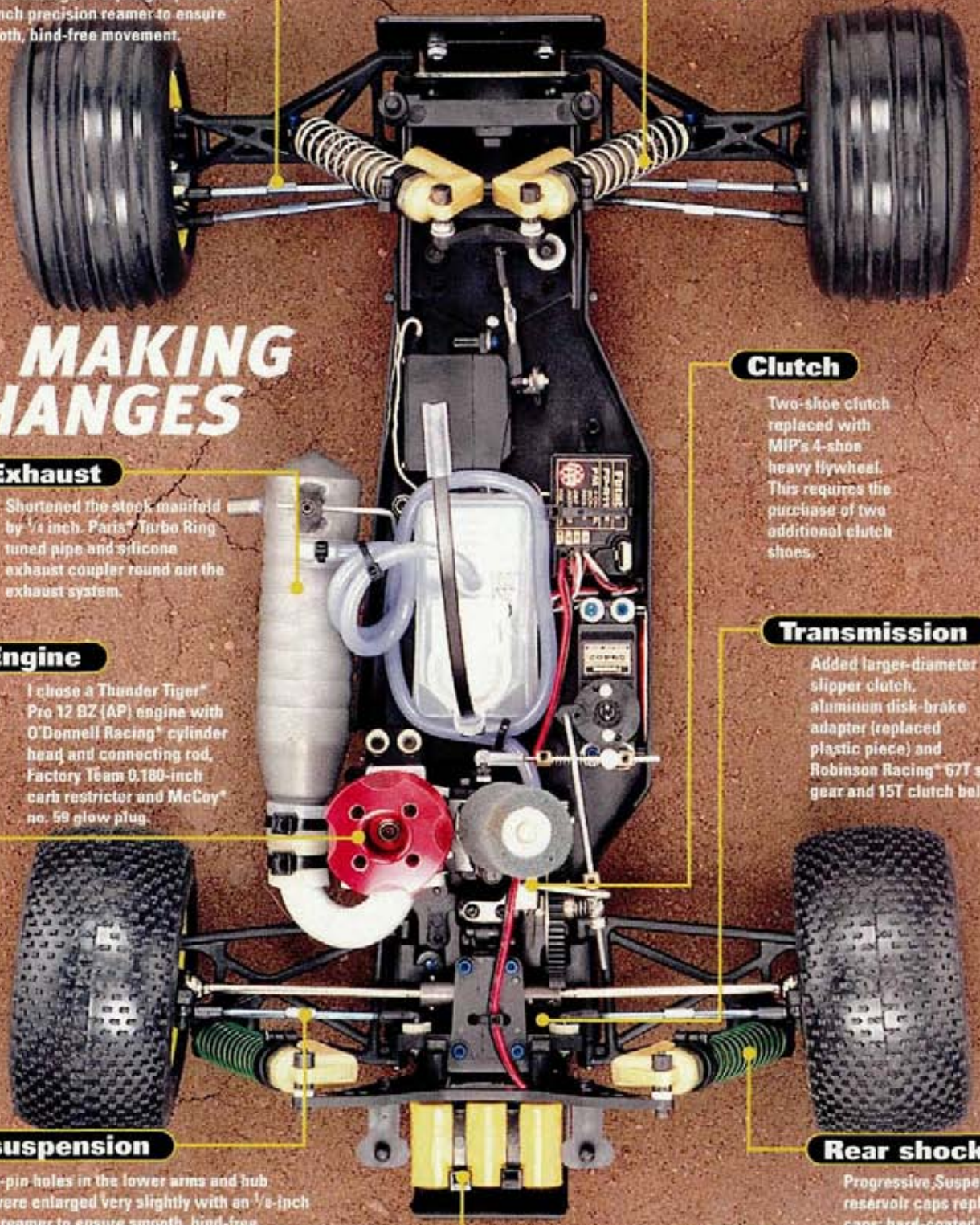
High-quality .12 engines generally produce more than enough horsepower for 1/10-scale trucks, so there's no need to get into the porting, balancing and blueprinting common with 1/8 on-road racing. You can, however, change a few things to improve your engine's performance.

- ***O'Donnell cylinder head:*** I use it because it is lighter and was designed to provide additional cooling.
- ***O'Donnell connecting rod:*** the engine's stock rod is very durable, but it's also very heavy. The O'Donnell rod is made of a stronger material, and it's much lighter, and that means a noticeably quicker throttle response.
- ***McCoy no. 59 glow plug:*** I use them almost exclusively because they seem to be the most durable and are more economical than the more exotic plugs that claim the ultimate performance. All but a few of the USA's top 30 drivers use them, too, so you can be sure that these plugs will benefit your racing endeavors.
- ***Associated Factory Team carb restricter:*** What? You want me to slow my engine down?! Yup. The carbs on most .12 engines were designed for a high-rpm performance. The restricters do a couple of things. They tame high-end performance to a level that makes the truck controllable, and they smooth the off-idle performance. The restricter may appear to slow the truck down, but you'll be surprised when you look at the stopwatch and realize that your lap times are actually faster!

An MIP 4-shoe heavyweight flywheel and a standard two-stage Associated air filter completed my racing mods. All the parts I used were designed to fit the O.S. 12 engine, but they fit the Pro 12 as well.

The Pro 12 turned out to be a stellar performer. It offers excellent power and is of a very durable construction. The Pro 12's average street price is also significantly lower than the more popular O.S. engine's. So if you're in the market for a new engine or are considering a GT truck for the first time, try the Pro 12.

Project RC10GT



MAKING CHANGES

Front suspension

The hinge-pin holes in the lower arms, block carriers and steering blocks enlarged very slightly with an 1/8-inch precision reamer to ensure smooth, bind-free movement.

Front shocks

Progressive Suspension reservoir caps replace the stock caps; hard-coated Factory Team Unobtainium shock shafts replace the stock shafts; more durable MIP blue seals replace the stock O-rings; use no. 2 piston, 35WT silicone oil and Associated Silver springs.

Clutch

Two-shoe clutch replaced with MIP's 4-shoe heavy flywheel. This requires the purchase of two additional clutch shoes.

Exhaust

Shortened the stock manifold by 1/4 inch. Paris' Turbo Ring tuned pipe and silicone exhaust coupler round out the exhaust system.

Transmission

Added larger-diameter T3 slipper clutch, aluminum disk-brake adapter (replaced plastic piece) and Robinson Racing® 67T spur gear and 15T clutch bell.

Engine

I chose a Thunder Tiger® Pro 12 BZ (AP) engine with O'Donnell Racing® cylinder head and connecting rod, Factory Team 0.180-inch carb restricter and McCoy® no. 59 glow plug.

Rear suspension

The hinge-pin holes in the lower arms and hub carriers were enlarged very slightly with an 1/8-inch precision reamer to ensure smooth, bind-free movement; 1.5-degree hub carriers replace stock, 0-degree carriers (requires four 3/16x3/8-inch flanged bearings). When the stock MIP CVD drive shafts wear out, replace them with the more durable Shiny CVDs. Factory Team blue titanium turnbuckles replace the stock steel turnbuckles.

Rear shocks

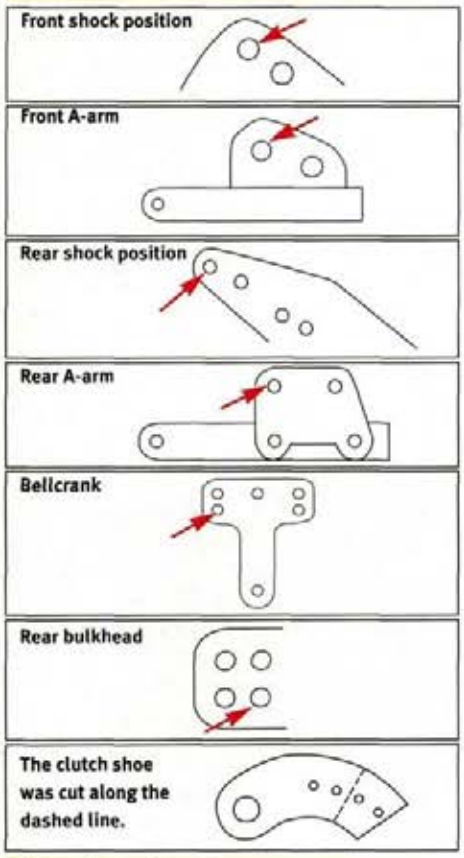
Progressive Suspension reservoir caps replace the stock caps; hard-coated Factory Team Unobtainium shock shafts replace the stock shafts; more durable MIP blue seals replace the stock O-rings; use no. 1 piston, 30WT silicone oil and Associated Green springs.

Radio system

The truck is controlled by a 3PDF FM radio system and two 9402 servos by Futaba® and a Bruckner Hobbies® 5-cell receiver pack.

Richard Saxton's ROAR GAS NATS SETUP

	FRONT	REAR
Tires (Pro-Line)	Edge M2	Bowtie M3
Inserts (foam)	Standard	Standard
Wheels	Pro-Line	Pro-Line
Camber	0°	-2°
Toe-in	0°	4.5° total
Ride height	Just above level	Level
Wheelbase	Long	
Shock length	Stock	Stock
Shaft length	1.02 in.	1.32 in.
Travel limiter	None	None
Piston	No. 2	No. 1
Oil	35WT	30WT
Spring	Silver	Green



Hub carrier toe-in: 1.5°
Front caster: 30°
Clutch shoes: no. 4
Steering blocks: in-line
Spur Gear: 66T
Pinion Gear: 15T
Slipper setting: tight
Body: Pro-Line Ford F-150
Engine: O.S. .12CZ-Z
Carburetor: O.S.
Fuel: 20% Dynamite* Blue Thunder
Glow plug: McCoy no. 59

PARTS USED

- **O'Donnell Racing**
  - Lightweight cylinder head.
  - Connecting rod.
  - 20-percent-nitro fuel.
- **Team Associated/Factory Team**
  - Blue titanium turnbuckles—part no. 1280.
  - 1.5-degree rear hub carriers—6366.
  - Four 3/16x3/8-inch flanged rear-axle bearings—9277.
  - Aluminum disk-brake adapter—7561.
  - 0.180-inch carb restricter—7713.
  - Unobtainium shock shafts (1.02 and 1.32)—6417/6416.
  - T3 slipper assembly/clutch—9251, 9252, 9253.
  - Clutch shoes—7601.
- **Pro-Line**
  - F-150 GT body—3078.
  - Velocity wheels (F/R)—2635Y/2636Y.
  - Tires (F/R) — Edge M2/Bowtie, 8095M2/8196M3.
- **Robinson Racing**
  - 15T clutch bell—2215.
  - Spur gears (66T, 67T)—2266, 2267.
- **Paris Racing**
  - Turbo Ring tuned pipe.
  - Silicone exhaust coupler.
- **MIP**
  - 4-shoe heavy flywheel—3019.
  - Blue shock seals—1043.
  - Shiny CVD drive shafts—1197.
- **McCoy Racing**
  - No. 59 glow plug.
- **Thunder Tiger**
  - Pro 12 BZ (AP).
- **Futaba**
  - 3PDF FM transmitter.
  - Two S9402 servos.
- **Bruckner Hobbies**
  - 5-cell receiver pack for RC10GT.

SETUP SUGGESTIONS

When you assemble the truck, pay close attention to detail and follow these suggestions:

■ **Body.** This has little to do with performance, and there's little you can do to improve aerodynamic efficiency. In my opinion, however, the Pro-Line* Ford F-150 GT body is the best looking, and it's certainly the most popular replacement at the track. The body used here was painted by Scott Branche of Bodies by Branche* (B3).

■ **Use liquid thread-lock** on all the fasteners that make contact with metal. Nitro engines produce a lot of vibration, so every nut, bolt and screw that isn't well buttoned down will loosen over time if you don't apply thread-lock. My favorite is Loctite* no. 242 blue. It holds the hardware firmly in place, yet it's pliable enough to allow the removal of the fasteners for maintenance.

■ **Flywheel installation.** When using the Thunder Tiger Pro 12 BZ (AP) engine, place the "Yokomo engine shim" (as it's referred to in the instruction manual) behind the taper that slides over the crank behind the flywheel. It will ensure the proper clearance between the clutch-bell bearing and the E-clip that's installed at the end of the crankshaft.

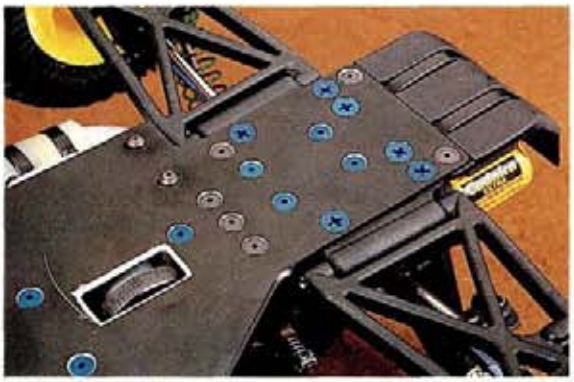
1.5 degree rear hub carriers provide more straight-line stability.

■ **Clutch.** When converting to a 4-shoe clutch, you must cut the clutch shoes to the proper length. How you cut the

There are four flywheel options for the RC10GT: stock, standard-weight 2-shoe; Associated standard-weight 4-shoe; MIP light 4-shoe; and MIP heavy 4-shoe. The lightest flywheel provides the quickest throttle response with compromised idle quality; the heaviest flywheel provides excellent idle but a subtle reduction in throttle response.

clutch shoes will determine how the clutch will react. Lighter (shorter) clutch shoes are slower and allow the clutch to slip a little before full engagement; heavier clutch shoes provide quicker engagement. In a stock clutch shoe, there are four holes (not counting the larger hole for the flywheel pin). It's best to start by cutting the shoes straight down the middle of the second hole from the end with the flywheel pinhole. In a 4-shoe setup, this is just about as heavy as you want to run the clutch shoes.

Experiment with lighter shoes, too. Sometimes, a quicker clutch can bog the engine because it engages too quickly. I've found that cutting the shoes in the middle of the first and second holes gives the best all-around performance.



A little attention with a countersink bit cleaned up the chassis holes and allowed the screw heads to be perfectly flush with the chassis bottom.

■ **Chassis.** The bottom holes for the 4-40 flat-head screws weren't properly countersunk, so the screw heads typically scraped the ground and slowed the truck down. It also made disassembly very difficult because the screw heads actually get worn down enough to make them difficult to remove. A high-quality 5-flute countersink bit (which costs less than 10 bucks) and a drill will help you cure this condition. Just go very slowly; you don't want to remove too much material.

■ **Fuel.** I choose 20-percent-nitro O'Donnell Racing fuel, and so do an overwhelming number of the best nitro off-road racers. The high demands placed on racing engines require a fuel that offers engine protection. Too many people will pick up just any fuel and then wonder why their engine overheated and even broke down. Don't take fuel choice lightly; it has a very significant impact on performance and reliability. R/C racing's élite consider only a few types of fuel suitable, and O'Donnell's is one of them.

■ **Tire balancing.** Even team drivers rarely take the time to balance their tires, but they end up using new sets much more often than we do. The size of truck tires and the tremendous speeds they reach makes balancing that final step toward ultimate performance. If you minimize the vibration caused by an out-of-balance tire, you free the suspension to do its job of handling the surface. This is another of those "Check your lap times" tuning tips. You might not be able to see it or feel it, but the stopwatch will show a difference!

FINAL THOUGHTS

I don't need to dazzle anyone with superlatives describing how well the truck runs. It was built with the input of the highest authorities in the world of 1/10 nitro racing. As a matter of fact, apart from the Thunder Tiger engine, which was just my experiment and is not yet widely used by racers (most use O.S.), this truck would be right at home on the pit table of the world's best nitro truck drivers!

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

sponsored by MIP Race With Us

RACER news

by George M. Gonzalez

GET UP TO SPEED WITH . . .

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This month, "Racer News" gets a little Euro flavor with a look at Schumacher, a manufacturer that has earned numerous national and international titles during its nearly 20-year history. Robin Schumacher is this month's "Innovator at Work," so here's your chance to find out why this company is considered by many to be a "sleeping giant."

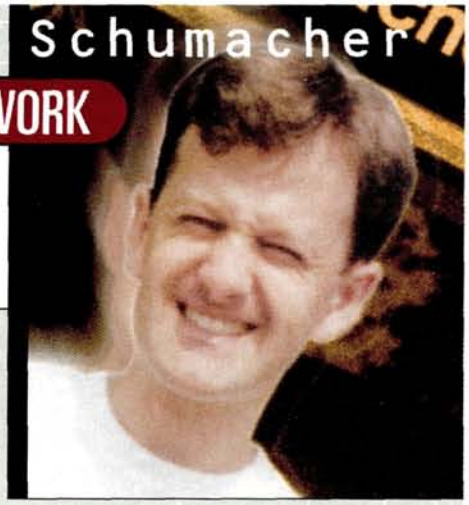
Alex Guerrero is well known throughout the racing community as a competitive driver who has the talent to win big, although he has not yet captured a major victory. So why is he the subject of this month's "Racer Profile"? Because he's an A-main finalist at just about every race he attends and one heck of a guy, as you will find out when you read our interview with him.

The ROAR On-Road Nats were held this year in red-hot Houston. In this edition of "Racer News," we bring you coverage of the sizzling track action.

As always, we bring you the latest in racing gear in our "Speed Shop" section, and a tip from the factory fast guys. This month, check out new products from Tech Racing, Reedy Modifieds and OFNA Racing, and a nitro-tip from national champion driver Tim Bump.

Robin Schumacher

INNOVATOR AT WORK



Throughout Europe, Schumacher R/C cars rival the Associated and Losi cars that are so popular here in the States. Schumacher also has a reputation for manufacturing state-of-the-art R/C kits and for sponsoring top-name drivers overseas. We had a chance to spend some time with Robin Schumacher at the 1998–'99 IFMAR Electric On-Road Worlds in England, Robin's native country. He was naturally very happy to be back home in the U.K. and was very hospitable.

Radio Control Car Action: For the benefit of readers who are unfamiliar with Schumacher, tell us a little about the company's history. When was Schumacher founded, who founded it, and what was its first product?

Robin Schumacher: The company was started by my father, Cecil Schumacher, in 1980. I used to race 1/12-scale cars, which were then the only electric R/C cars on the market. My father made some tune-up parts for me and then began to sell them. We started with the first-ever ball differential, which was a major innovation at the time because prior to that, everyone used gear differentials. Eventually, he became so busy with R/C parts that he left his job as a design engineer for Cosworth, where he designed Formula 1 racecar transmissions, and began making R/C parts full time from the garage at the side of the house.

We started making 1/12-scale car kits and then moved up to 1/10-scale off-road with the innovative original Cat 4WD, which Masami Hirosaka used to win his first world championship in 1987. The company has now grown into a modern factory employing about 25 people.

RCCA: Schumacher vehicles are known for innovation in design and materials used. Which criteria are considered when new products are designed, and who are the principal designers or engineers at Schumacher? Does full-scale racing influence the design of your vehicles?

RS: The company has always been actively involved with racing, and we pride ourselves on making high-quality, competitive products that use the very latest materials and technology. Cecil Schumacher passed down the standards of engineering excellence that he learned in full-size F1 racing, and this had a very positive influence on the company. The design and development of our cars, however, is very much a team effort; there is input from our race engineer, Phil Booth, who's a former 1/8-scale gas on-road world champion; our engineering manager, Vic Ababurko; and design engineer Martin Patching. Our team drivers give us valuable feedback on what they want from the cars, and our sales staff contributes information on the market and customer opinions.

RCCA: European R/C racing is quite different from its U.S. equivalent. In Europe, off-road racing occurs mostly on fairly smooth grass and soft dirt tracks, while in the U.S., off-road predominantly takes place on bumpy, hard-packed dirt tracks. Another difference is that in Europe, touring cars usually are raced on carpet, while in America they're raced mostly on asphalt. The Fireblade 2000 USA 2WD off-road buggy is, to the best of our knowledge, Schumacher's first off-road vehicle designed specifically for the U.S. market. Will we see other Schumacher vehicles designed especially for the U.S. market anytime soon?

RS: Yes, there are some differences—especially in off-road, where we race on grass and in the rain. Our 2WD off-road buggy, the Fireblade USA, features more upright shocks and adjustable weight distribution to make it more suitable for American-style tracks that have big jumps. The differences are less significant with on-road cars, especially with our touring car, the SST '98; it's very tunable for varying track conditions. We will have to look at each

Continued on next page

RACER news

Speed Shop

Tech Racing Graphite Chassis for the Tamiya TA03R

Tech Racing* has just what you need to make your Tamiya TA03R tub-chassis car into a carbon-fiber flier. The new graphite chassis replaces the plastic tub with a lighter, more rigid, double-deck graphite chassis that allows stick- or saddle-type battery packs to be mounted in the same forward position as in the stock chassis or farther aft to adjust weight distribution. The forward position provides more on-power steering, and the servo is mounted on a tray above the battery (just as it is on the stock TA03R). The rearmost battery position improves rear bite, and the steering servo can be mounted on the main chassis plate for a lower CG. The Tech Racing graphite chassis also includes a set of aluminum servo mounts; a nice bonus.

The Tech Racing graphite chassis may also be installed on the short-wheelbase TA03RS; it will stretch that car's wheelbase to the legal limit. It may also be installed on the TA03F-Pro to convert it to a more conventional mid-motor layout. An extra idler bearing will be required to allow the belt to clear the motor on the TA03F-Pro, however. Either way, the Tech Racing chassis is a cool way to increase the performance and tunability of your TA03 chassis car while making your vehicle stand out from the rest of the field. Keep in mind, though, that the Tech chassis (and all other non-Tamiya aftermarket hop-ups) is not legal at Tamiya-sanctioned racing events, but it's perfectly legal for all other forms of racing. Part no. T3-A; $130.

Continued from previous page

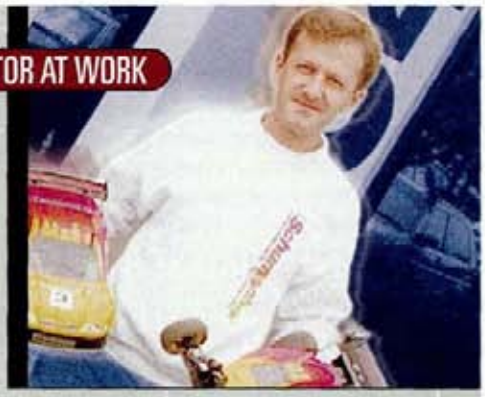
product individually, but I think we now consider the U.S. market very seriously every time we release a new product.

RCCA: Schumacher USA has been around for a few years now; has operating in the U.S. improved customer service and factory support?
RS: Schumacher USA was established in Tampa, Florida, in 1990; after mixed success in the early years, it is now running very well. Having our own office is certainly beneficial and allows us to really keep in touch with our American customers. We distribute our products ourselves directly to the dealers. This works out well for us, and we have established very good relationships with many dealers across the country. We find that we can give better technical backup and customer service, and having just one inventory location enables us to provide a very high order-fill rate and fast delivery service. Although the number of hobby stores that carry Schumacher products has increased significantly in the last two years, parts can still be hard to find in some areas of the country, so we also offer a direct mail-order service. Anyone who has a Schumacher car can call us for parts, even if the model is five or six years old.

RCCA: Operating the U.S. facility has brought you far from your native country. Do you enjoy life in the U.S.? What are some of the things you miss from back home?
RS: I like traveling, and I enjoy the challenge of moving to a new country, so I accepted the opportunity to move to Florida to manage Schumacher USA in February '97. Even though we share the same language, the culture and lifestyle in England are quite different, but I am enjoying it over here. I miss my family and friends, of course, and sometimes the cool weather, or the English pubs, but overall, it's pretty good. I lived in Japan for a year and a half before moving here, so I'm quite used to being away from home.

RCCA: What do you like to do in your free time?
RS: I still race most weekends, which for me is partly work because I meet customers and learn about the cars, but I enjoy it. Outside of R/C cars, I play a little tennis and squash and try to keep fit, or I spend time with my girlfriend, Yumiko.

INNOVATOR AT WORK



RCCA: Team Associated/Reedy, Team Losi and Trinity always have scouts looking for hot, new talent. Does Schumacher plan to aggressively pursue new talent in the U.S., or is the company focused on sponsoring drivers in other parts of the world?
RS: Sponsoring drivers is a very important form of promotion. We are always looking for new drivers, and instead of sponsoring a handful of expensive, big-name drivers, we have quite a few drivers across the country who are very good at their local and regional races, and they do an excellent job of promoting Schumacher cars. Our top sponsored drivers tend to be in Europe and in Florida,

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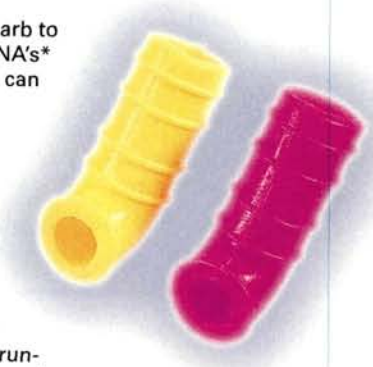
MIP
Race With Us

Reedy Modifieds Battery Connectors

Drivers who take R/C racing very seriously almost always solder their battery packs directly to the motor and ESC. But, as you know, the AC power required for hard-wiring isn't always available, especially if you race outdoors or at parking-lot racing events. Those of us who like the convenience of conventional, single-piece battery connectors, but find that they usually complicate the wiring process and almost always require longer pieces of wire to complete the installation (which increase the vehicle's weight and lower electrical efficiency to boot), can take heart. Reedy Modifieds'* new silver battery connectors are the answer. These connectors provide racers with an efficient alternative to hard-wiring that's even more convenient than using standard battery connectors.

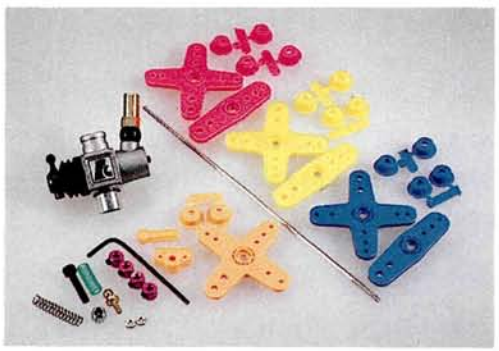
Ten battery connectors (five male and five female) are included in every package, and these allow you to wire up four battery packs and one ESC, or five battery packs, or five ESCs, or any combination you like because the connectors are universal. Simply solder a male and a female connector to the positive and negative terminals on the back of the battery and corresponding male and female connectors to the positive and negative leads of your ESC. You now have the efficiency of hard-wiring and the convenience of using battery connectors without the need for complicated wiring layouts and extra lengths of wire.
Part no. 652; $10.

New Nitro Accessories from OFNA Racing



Now you can add a high-performance slide carb to your .12- to .17-powered touring car with OFNA's* new slide carb and linkage kit. The slide carb can be bolted right onto your O.S., Force, or other engine of similar design; with its efficient operation and adjustable high- and low-needle valves, it will increase your vehicle's performance and tunability. OFNA sells an accessory linkage kit that makes the installation a snap on most cars; call OFNA for more information.

Don't you hate it when your tuned pipe loosens and falls off during a race? That ear-piercing sound your engine makes when it's running uncorked is a good indication that you need one of OFNA's silicone-manifold joint-tube tuned-pipe couplers. According to OFNA, this specially designed tuned pipe/header coupler holds tighter than other types of couplers, thanks to its 45-degree elbow that grabs the header. In addition, its end has a larger surface area, and ribbed sides ensure that the zip-ties stay put.
Part nos. 54120 (.12S, .15S, .17S slide carb), 10721-4 (linkage kit; specify color), 10180 to 10184 (silicone manifold joint tube; specify color).



RACER PROFILE
ALEX GUERRERO

Alex Guerrero is a talented driver who has won several non-sanctioned racing events but has not yet achieved a big, national championship win. If you've studied the winners' charts that we provide with every event we cover in this magazine, you know that Alex is a regular A-main finalist. There's a lot more to Alex than his lime-green Losi vehicles, and we invite you to spend a few moments with one of the most consistent drivers in R/C.

VITAL SIGNS

Age: 22
Occupation: student
Hometown: Los Angeles, CA
First R/C car: original Team Associated RC10
Favorite racing class: 2WD mod
Favorite track: "I like them all"
Favorite race: Florida Winterchamps
Sponsors: "Airtronics, Novak, Peak Performance, Team Losi, Lunsford, and special thanks to BJ over at MIP"
Hobbies: mountain-bike trail-riding, collecting old and current records, snowboarding and rocketry

Radio Control Car Action: Everyone who races on a regional or national level certainly knows your name, but for the benefit of those who may be new to the hobby, let's start by talking about your past. How and when did you first discover R/C cars?
Alex Guerrero: I first laid eyes on an R/C car 10 years ago at a mall toy store. I immediately fell in love with the original short-arm RC10 and began saving my allowance. A few weeks later, I purchased the complete car with a mechanical speed control. I built the car and was stoked.

RCCA: Man! You must have had to do a lot of chores if you were able to save up enough allowance money to buy a car in just a few weeks. How long was it before you started competing, and how long was it before you decided you were ready for sponsorship?
AG: I began competing on a limited basis about three years after I built my first car. I raced at all the Southern California tracks, including the original Hot Trax Raceway and the famous Radio Controlled Hobbies Raceway. Eventually, after competing in all types of events, I was noticed by Peak Performance, and it became my first sponsor.

RCCA: What do you enjoy about racing R/C cars?
AG: I enjoy the speed and competitiveness we achieve during racing, but R/C racing is most fun when I'm out racing with my buddies, just having fun and not being serious.

RCCA: Whom do you consider to be your toughest competitors?

Continued on next page

RACER news

Continued from page 142

INNOVATOR AT WORK

where we can meet them more often at the tracks, do testing and generally work more closely with them.

RCCA: Schumacher is no stranger to nitro power; does the company plan to release any new nitro products in the future, or is its focus more on electric power?
RS: We have been making gas-powered cars for several years, and our Nitro 21 1/10-scale truck, with its huge, .21-size engine, is a very popular and fun vehicle—although not designed to fit in any racing class. Our next major product release will be a gas-powered version of the very successful SST '98 4WD touring car; it will be powered by a .12-size engine. This is a growing class, and I am looking forward to doing some gas touring-car racing.

RCCA: What are some of your best sellers, in the U.S. and internationally?
RS: In America, we have four main products: the SST '98 4WD electric touring car, the Cat '98 4WD off-road buggy, the Fireblade USA 2WD off-road buggy and the Nitro 21 XT gas truck, or touring car. We also offer a wide range of hop-up parts and accessories, such as tires, chargers, tools, Corrally motors and Team Orion Ni-Cds. In Europe, the product mix is slightly different. We are stronger in off-road and in the low-cost, entry-level market with our Club 10 and Wildcat kits.

RCCA: In closing, Robin, what does the future hold for Schumacher?
RS: We will continue our main activity of building high-quality, competitive R/C racecars, and we'll continue to work hard to make even better cars. We also plan to develop the range of accessories designed for the entry-level market. We have made a lot of progress recently in the U.S., and Schumacher cars are gradually becoming a more familiar sight at race-tracks around the country. There is still work to be done, however, and we need to reach the many people who have not yet tried a Schumacher R/C car.

RCCA: Thanks again for your time, Robin; we wish you continued success.

RACER PROFILE

Continued from previous page

AG: My toughest competitors have to be Team Associated's Mark Pavidis and his crew.

RCCA: What is the most difficult aspect of being a sponsored driver?
AG: Being sponsored requires that I attend all or most of the big races around the country. These races are usually a week long. As a full-time student, I sometimes find it very difficult to stay on track with my school responsibilities because of my travels.

RCCA: What else do you like to do when you aren't racing?
AG: I enjoy mountain biking, playing tennis, hanging out at the beach, attending concerts, playing guitar, fiddling with DJ equipment and dating women.

RCCA: Which type of music are you into?
AG: Here's a brief rundown of the types of music I listen to: rock—the Doors, Pink Floyd and Santana; electronic/techno—Fat Boy Slim, Crystal Method, Dust Brothers, Carl Cox, Orb and Portishead; jazz—Lonnie Smith, Bobby Hutchinson, Cal Tjader.

RCCA: You're a student. What are you studying, and what are some of your goals?
AG: I'm studying computer science, and one of my goals is to begin my own music production business. Also, I plan to start a small manufacturing business as well as become an innovator of new software.

RCCA: Those are ambitious goals! Alex, I've mostly seen you race off-road vehicles, but I've heard that you also like to race touring cars. Do you feel that competing in touring-car events helps you with your off-road racing, or is there a negative effect?
AG: I don't think that racing on-road hurts or helps my off-road racing at all. I just think it's great to have fun on pavement every once in a while.

RCCA: Your lime-green vehicles certainly distinguish your cars from the rest of the pack. I guess my question is: why green? And will you ever drive a car that sports a cool custom paint job?
AG: I simply go with the green because it saves time and money and is very visible at night. Remember what happened at the Florida Winterchamps when the race went overtime, and the track had very few lights? I was still able to see my car. Besides, if I go for a custom paint job, I will lose my distinguishing look that some racers have grown to fear.

RCCA: Thanks, Alex. Good luck with all your endeavors; I'll see you at the track.

RACER TIP OF THE MONTH

Tim Bump
OFNA Racing team driver

Don't be too anxious at the start of a long nitro race; I sometimes let other cars go by to ensure that I get a clean start and that I don't break my car in the first corner. Know how much run time your car gets on a tank of fuel. Timing your car is the best way to do this; with this knowledge, you and your pit person will be able to get more mileage from each pit stop by not pulling the car in too early or—heaven forbid—too late. During the race, I'm in constant communication with my pit person so I always know my position, where the second-place car is and everything else I need to know about my car's condition. Naturally, I always try to lead the race, and when I do, I like to stay one single lap ahead of my nearest competitor. Remember: go just fast enough to win and no faster. It makes no sense to punish your vehicle if you don't have to.

RACER news

On-Road National Championship

by Kevin Hetmanski

Texas-style road racing

This year's ROAR On-Road Nationals were held at Performance Raceway in Houston, TX. More than 100 contestants traveled from all over the U.S. to compete for the title in each of six classes: sedan stock, sedan mod, 1/10-scale stock, 1/10-scale mod, 1/12-scale stock and 1/12-scale mod.

Temperatures higher than 100 degrees F and track-surface temperatures in excess of 150 degrees F made it tough on the racers and their equipment. Two rounds of qualifying were held on Friday and two on Saturday; all Mains were held on Sunday. Triple A-mains decided the championship, and that meant that the A-main drivers had to work even harder than everyone else.

QUALIFYING

A point system determined the qualifying positions, and the drivers scored points according to their finishing positions. Of the four qualifying rounds, only the two best were used to determine the qualifying order; the remaining two were thrown out and used only in the event of a tie. In Sedan Stock, local driver Rhett McNair showed all the stock boys who was boss by taking the TQ position, while Team Trinity/Team Losi driver Joel Johnson set the TQ pace in Sedan Mod with his Team Losi Street Weapon. Local driver David Joor worked hard to earn the TQ position in the 1/10-scale Stock. Joel Johnson ended up on top again in 1/10-scale Mod. In 1/12-scale Stock, New Yorker Shawn Wright earned the TQ. The 1/12-scale Mod class was dominated—once again—by Joel Johnson.

Charlie Barnes's concours-winning car. It features an Andy's Stratus body and a complete interior. Details include a nitrous-oxide bottle, roll bar, braided steel lines, fire extinguisher, disk brakes and a helmet that matches the paint job on the body. Way to go, Charlie!

A-MAINS

• **Sedan Stock.** In A-1, Rhett McNair made it look easy. He jumped out to an early lead and never looked back. The second A-main went pretty much the same, and McNair showed everyone he was unstoppable. Since he had already clinched the national championship, McNair didn't participate in A-3. The second- and third-place slots, however, had not yet been determined. Jordan Musser jumped out to an early lead. Hitec's Mike Mayberry was Jordan's only threat, but he ended in first nevertheless. In the end, McNair took first, Musser finished second, and Mayberry finished third.

• **Sedan Mod.** In the first A-main, Joel Johnson jumped out in front right at the beginning, but Team Yokomo/Maxtec driver Barry Baker gave him a run for his money. With one minute to go, Johnson had a commanding lead over the rest of the field and ended up easily winning the first leg of the triple A-mains. In the second A-main, Johnson once again jumped out in front, but Team GM driver Jon Orr wasn't far behind. With 20 seconds to go, Team Trinity driver Josh Cyrul acquired second position and was soon all over Johnson.

Cyrul just didn't have enough time to catch Johnson, though, and as a result, Johnson finished first; Cyrul wasn't far behind in second. The third and final A-main had its share of battles, with David Joor taking an early lead. The most exciting skirmish was for fourth, though. Team Yokomo driver Greg Hodapp fought hard for his teammate Baker's position, but Baker ended up winning the battle. Meanwhile, Joor flipped over and gave away the lead. At the 2-minute mark, Orr took over the lead with Team Losi's Ron Rossetti close behind. Orr had a huge lead at the end, and no one was able to catch him. In the end, Joel Johnson finished first, Jon Orr took second, and Josh Cyrul finished third.

• **1/10-scale Stock.** Watching the start of the first A-main race was like watching bumper cars go at it at an amusement park. After all the cars had been separated at the start, Chris Mazzola emerged with the lead. In this race, David Joor and Eric Bellins faced off for second, since Mazzola was the runaway leader. These two guys battled it out to the very end. Mazzola won easily, while Joor and Bellins finished in second and third, respectively. In the second A-main, Joor jumped out to an early lead, but he rolled his car about halfway through and gave the lead to Eric Vasutin. Toward the end, these two fought for the lead, but Vasutin crossed the line first. In the third and final A-main, Joor once again jumped into the lead and never looked back. Vasutin ended up winning the 1/10-scale Stock national championship while Joor finished in second, and Mazzola finished third overall.

• **1/10-scale Mod.** Joel Johnson jumped into an early lead at the start of the first A-main, but the real battle was between Team Trinity driver Mike Blackstock and Team Yokomo's Mike Swauger. Toward the end of the race, Blackstock's car was launched off the track. Team Associated factory

pilot Mark Pavidis "came from beyond" to finish the race in first. In A-2, it was Johnson in first with Josh Cyrul following, while Swauger was putting down some really fast lap times in third. Pavidis had problems and was nowhere to be found. Johnson ended up winning the A-2 Main.

The A-3 Main was very critical, since the title was still up for grabs. Again, Johnson took an early lead with Cyrul not too far behind. Johnson easily won the A-3 Main to take the win and the national championship. Cyrul had to settle for second, while Swauger rounded out third.

• **1/12-scale Stock.** Steve Rossi took the lead in A-1, but midway through the race, Shawn Wright stole it. With 20 seconds to go, though, Wright dumped; this gave the lead and the win to Chris Mazzola. In the second A-main, Mazzola took off with an early lead that he maintained for an easy win. In the third A-main, Wright was once again blessed with an early lead. At the 2-minute mark, a huge crash at the start of the straightaway gave the lead to Rossi. He was able to pull away from the rest of the crowd and chalk up another win. Mazzola won the national championship, Steve Rossi finished second, and Shawn Rayfield finished third.

• **1/12-scale Mod.** Of course, it was Joel Johnson out in front again—this time, enjoying a huge lead. Mike Blackstock secured second, while Josh Cyrul claimed third. Unfortunately, Blackstock ran into trouble and was out of the race at the 3:00 mark. This returned second to Cyrul, while Johnson continued to lead, and the race ended with them in that order. In the second Main, Johnson claimed a huge lead once again, but he crashed toward the end and gave the lead to Jon Orr, who seized the opportunity and won.

The third and final A-main was the most exciting race of the weekend. Johnson jumped into the lead with Orr close behind. These two battled it out for the lead until Johnson made a costly mistake; though he had secured the lead, his batteries dumped, and Orr took the win. After the points had been totaled, the win went to Jon Orr, with Joel Johnson finishing second and Josh Cyrul in third.

FINAL THOUGHTS

It was a great weekend of racing. Thanks to all the guys at Performance Raceway for their support and for putting on a fine race. The racers worked hard to put on a good show, and everyone did a fantastic job; it was a lot of fun. See you all there next year.

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

ROAR 1/12 & 1/10 ELECTRIC ON-ROAD NATIONALS

STOCK

1/12 Touring Car

FIN	QUAL	DRIVER	CHASSIS	BATTERY	ESC	RADIO	BODY	TIRES (F/R)	TRACTION ADDITIVE	PINION/SPUR
1	1	Rhett McNair	Schumacher	GM VIS	GM V12	Airtronics	Protoform Volvo	Pro-Line S3	JG Express	36/112
2	2	Jordan Musser	Losi Street Weapon	GM/SMC	Tekin G-10	Airtronics 3PS	Andy's Stratus	Losi Slicks	None	28/76
3	3	Mike Mayberry	HPI RS4 Pro	XIPP Power Voltz	Hitec HFX	Hitec Lynx FM	Andy's Stratus	S3 V-Rage	None	36/111

1/10 On-Road

1	2	Eric Vasutin	Trinity	Maxtec	Tekin G9	KO Propo	Andy's Stratus	TRC	Paragon	24/120
2	1	David Joor	Trinity Switchblade	Trinity Team Edition	Novak Cyclone	Airtronics	Protoform P35	TRC Pink	Trinity Zip Grip Free	26/120
3	3	Chris Mazzola	Trinity Switchblade 10	Trinity Team Edition	Tekin G10	NA	NA	TRC	David Spashett	30/120

1/12 On-Road

1	3	Chris Mazzola	Trinity Switchblade 12JS	Trinity Team Edition	Tekin G10	NA	Protoform	TRC	David Spashett	28/100
2	2	Steve Rossi	Trinity	Trinity	Novak	KO	Protoform	TRC	Trinity	24/100
3	4	Shawn Rayfield	Associated 12LC	Race Tech EV Cells	LRP	Airtronics	Protoform	Jaco	NA	NA

MODIFIED

1/12 Touring Car

FIN	QUAL	DRIVER	CHASSIS	MOTOR	BATTERY	ESC	RADIO	BODY	TIRES (F/R)	TRACTION ADDITIVE	PINION/SPUR
1	1	Joel Johnson	Losi Street Weapon	Trinity D3 9x2	Trinity	Novak Cyclone	Airtronics M8	Andy's Stratus	Losi Blue/Pro-Line S3	Zip Grip Free	19/82
2	5	Jon Orr	Yokomo YR-4M2	GM 11x3	GM VIS 2000	GM V-12	Airtronics Caliber	Andy's Stratus	Pro-Line S3	GM	26/108
3	10	Josh Cyrul	Losi Street Weapon	Trinity D3 10 double	Trinity	Novak Cyclone	JR Propo	Andy's Stratus	Losi Slicks	None	20/84

1/10 On-Road

1	1	Joel Johnson	Trinity Switchblade 10	Trinity D3 12x2	Trinity	Novak Cyclone	Airtronics M8	Andy's Mercedes	TRC	Trinity Zip Grip	23/120
2	2	Josh Cyrul	Trinity Switchblade 10	Trinity D3 12 triple	Trinity	Novak Cyclone	Jr Propo R-1	Andy's Mercedes	TRC	Trinity Zip Grip	18/93
3	9	Mike Swauger	Yokomo	Reedy	Reedy	LRP	Airtronics	Andy's	Jaco	Paragon	24/116

1/12 On-Road

1	2	Jon Orr	Associated 12LC	GM 14x4	GM VIS 2000	GM V-12	Airtronics	Andy's Mercedes	Jaco	GM	21/98
2	1	Joel Johnson	Trinity Switchblade 12JS	Trinity D3 14x2	Trinity	Novak Atom	Airtronics M8	Andy's Mercedes	TRC	David Spashett	24/100
3	3	Josh Cyrul	Trinity Switchblade 12	Trinity D3 14 double	Trinity	Novak Atom	JR Propo R-1	Protoform Nissan	TRC	Trinity Zip Grip	26/100

THE ROAR Stock Off-Road Nationals should be renamed, "The Paying Customer Nationals." Since ROAR separated the stock and modified classes at its national events, the Stock Nationals has become what ROAR stock should have been all along—for the little guys! No; not short people; you know, the great unsponsored masses!

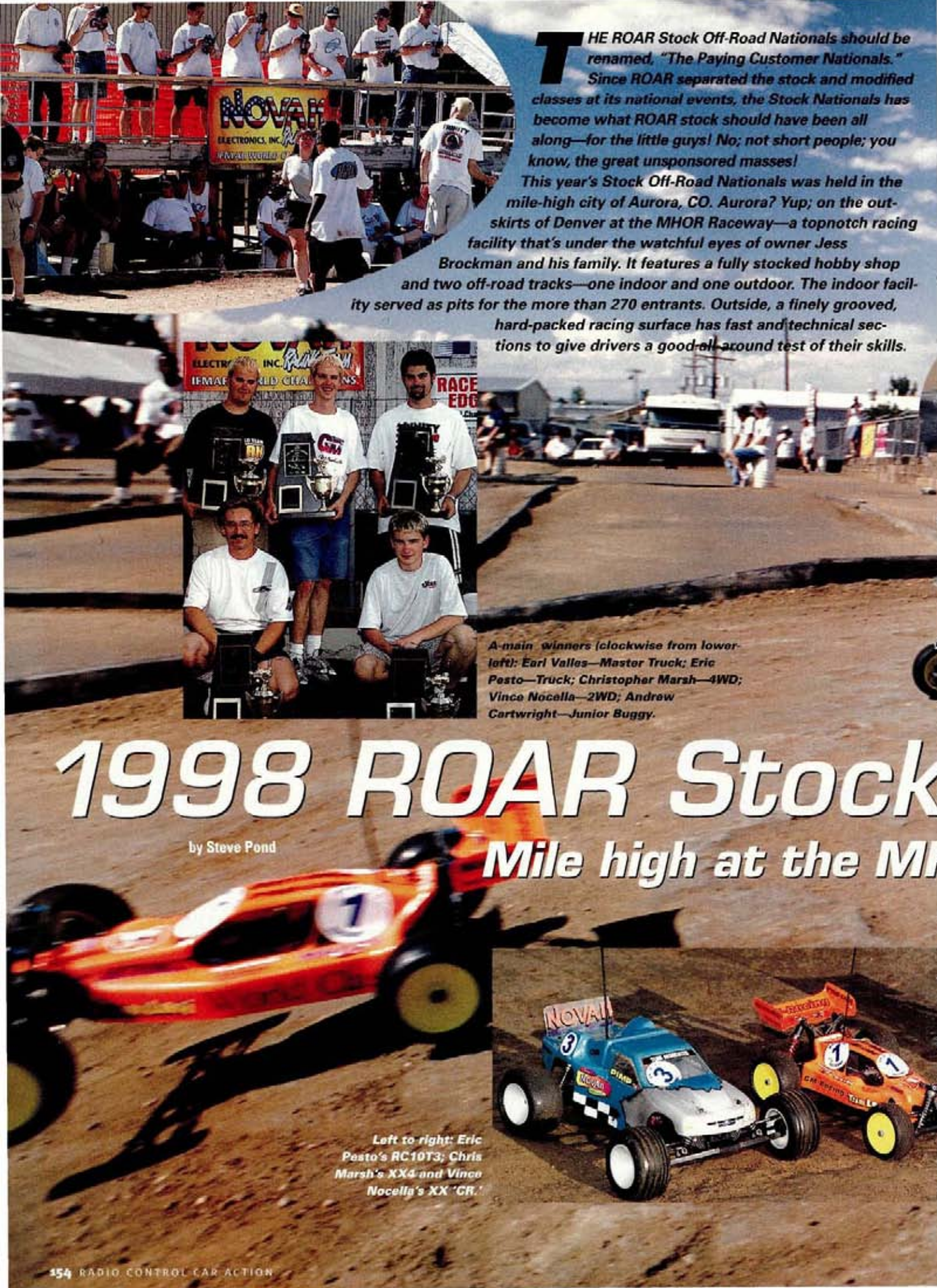
This year's Stock Off-Road Nationals was held in the mile-high city of Aurora, CO. Aurora? Yup; on the outskirts of Denver at the MHOR Raceway—a topnotch racing facility that's under the watchful eyes of owner Jess Brockman and his family. It features a fully stocked hobby shop and two off-road tracks—one indoor and one outdoor. The indoor facility served as pits for the more than 270 entrants. Outside, a finely grooved, hard-packed racing surface has fast and technical sections to give drivers a good all-around test of their skills.

A-main winners (clockwise from lower-left): Earl Valles—Master Truck; Eric Pesto—Truck; Christopher Marsh—4WD; Vince Nocella—2WD; Andrew Cartwright—Junior Buggy.

1998 ROAR Stock

Mile high at the MH

by Steve Pond



Left to right: Eric Pesto's RC10T3; Chris Marsh's XX4 and Vince Nocella's XX "CR."

Nationals

R R/C Raceway

Ernie Ledbetter took top honors in concours with this Valvoline/Star Trek RC10T3.

PHOTOS BY STEVE POND

The event officially kicked off on Tuesday, so drivers had a full three days of practice before the start of qualifying. Late on Thursday, an unseasonable hour-long storm dumped a few inches of rain on the track and flooded it. At the track's lowest end, the barriers were barely visible under the 6+ inches of water! The Brockman gang showed a tireless determination to kick off the event on a good surface. Right up to the start of the first qualifying round, a battalion of volunteers armed with power tampers, shovels, rakes and brooms worked to make the track race-worthy. The high-traction blue groove that this track is well known for had been washed away, but it wouldn't take long to reappear.

QUALIFYING

Friday morning's qualifying kicked off right on schedule, following the standard ROAR format of four rounds. The points system determined standings in each round, and the drivers' two best rounds established their positions in the Mains. At the end of Friday, the heats were shuffled for the final qualifiers.

The highlights included a flawless performance from Colorado's Christopher Marsh driving a Losi XX4. Marsh ran the overall fastest round, running 12 laps in 5:08.85, and he took the top spot on the A-main starting grid. His XX4 was closely followed by an XX4 driven by Brian Westerman, who was only 2 seconds off the pace. Filling the third spot on the "A" list was Californian Nick Lasley's XX4.

In 4WD, the XX4 dominated by grabbing five of the remaining seven spots and leaving just enough room for two Schumacher Cat '98 buggies to fill out the Main.

The fastest run in 2WD was by California's Justin Morrison with a Losi XX 'CR.' With 12 laps in 5:20.47, he was just 12 seconds off the pace of the fastest 4WD run. This fast round, however, wasn't enough to snag him the TQ spot in the class. New York's Vincent Nocella, also driving an XX 'CR,' drove more consistently and narrowly snagged top honors. In third was Eric Pesto and his Associated B3 (one of two in the class). Team Losi cars took seven of the top 10 qualifying spots. Number four was a lone, but very fast, Schumacher Fireblade USA.

The fastest truck lap times were right in the middle of the 2WD and 4WD times. Nick Lasley turned in the fastest time with his XXT 'CR' and 12 laps in 5:16.60. Second was taken by Brian Westerman, also with an XXT 'CR,' and the third qualifier was Eric Pesto, driving a T3.

THE MAINS

By Sunday's Mains, the very desirable blue groove had been carved into the track, and as the lower Mains got under way, it was evident that traction had increased considerably. Seeing cars traction-roll in the early Mains, many drivers scheduled for later ones scrambled to mount some harder tires to reduce traction!

• 2WD. Round one: in the first of three 2WD Mains, Justin Morrison and TQ Vince Nocella locked horns for just about the entire run. They broke away from the rest of the field and ran a very close race right down to the buzzer, but Morrison took the win. Nocella finished less than 1 second behind and was followed by Jarrod Hurd, who was 8.5 seconds back.

Round two saw a dominating performance by Nocella, who set the event's fastest 2WD run with 12 laps in 5:09.05—half a lap faster than the best qualifying effort! He was followed across the tape by first-round winner Morrison, and third went to Eric Pesto.

Going into the third and final round, Nocella and Morrison were tied with 199 points (first- and second-place finishes). The closest threat to them was Pesto, who already had fifth- and

Continued on page 161

They've got class!

As expected, the event had the usual ROAR classes, but there were also two others that I (for one) hadn't seen before: Masters Truck (for the 40 and over racers) and Junior Buggy (for racers of 15 and under).

Having spent much time in the former category and now fast approaching the latter, I thought these were a great idea. The younger drivers haven't had a chance to hone their driving skills to the level of the 20-somethings, and the farther away you get from the 40 marker, theory is, the more skill you lose (I intend to prove this wrong when the time comes), so peer group competition is good. It gives the younger and older competitors a chance to compete without getting the decals sucked off their bodies by 20-ish racers with perfect vision and cat-like reflexes, and they can avoid finding themselves unjustly deposited in the ZZ main.

More thanks are due to the insightful brains behind these Nats. This race was more fun for more people than any race I've recently attended!

Something for everyone!

The Stock Off-Road Nationals at the MHOR Raceway included a few activities that made this an event rather than just a race. The Brockman family, owners of the facility, arranged to have a "bungee run" partway through Saturday's qualifiers. Don't worry; I'll explain.

In keeping with the racing theme, the bungee run had pairs of contestants (who typically made a "gentlemen's bet" on the outcome) strap themselves to long, strong bungee cords and make a run for it, stretching the bungee as far as they could. To mark how far they got before the bungee overpowered them and snapped them back to the starting line, they had to place a baton on the run's center barrier. This was a great distraction for the kids—both the little and overgrown varieties.

Following the bungee run, competitors and their families enjoyed an excellent barbecue. This was welcomed by the racers, who had had little time to eat during the day.

Finally, Jess Brockman teamed with Trinity to set up a photo area in which the top three drivers in *every* Main could have their photos taken trackside so they'd have something in addition to a trophy to take home with them!

WINNING SETUPS

Eric Pesto • RC10T3

FRONT SUSPENSION

Front block carrier (caster setting) ..... 25°
Front ride height ..... Arms level
Camber ..... -2°
Toe-in or toe-out ..... 1° toe-in
Shocks ..... Standard
Oil 40WT
Piston ..... No. 1
Spring ..... Silver
Front diagram placement ..... Outside, outside, middle

REAR SUSPENSION

Suspension mounts: ..... 3°
Rear ride height ..... Slightly below level
Anti-squat ..... 3°
Camber ..... -2°
Wheel hub position ..... Front
Shocks ..... Standard
Oil 35WT
Piston ..... No. 1
Spring ..... Green
Rear diagram placement ..... Middle, inside, inside, standard

OTHER

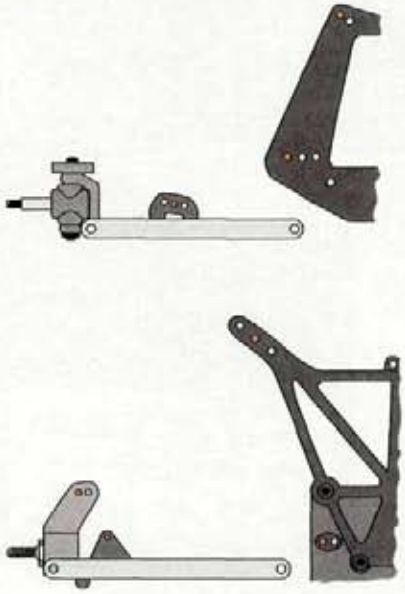
Tires (F/R) ..... Pro-Line foam (firm)—Edge M2/Holeshot M2
Front wheels ..... One-piece
Chassis ..... Extra-long

MOTOR, TRANSMISSION & ELECTRICAL

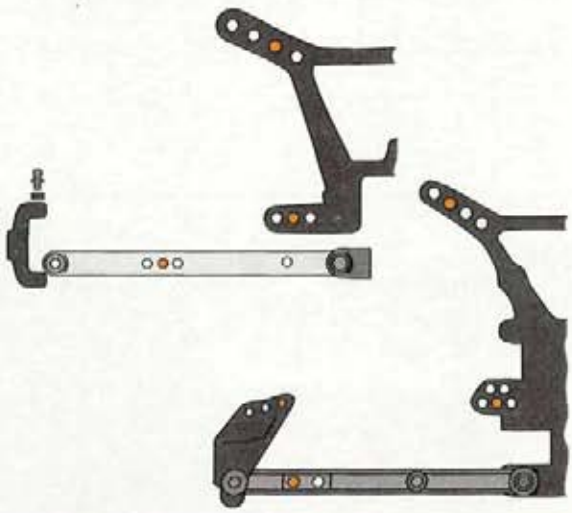
Motor ..... Handout
Pinion/spur 19/87
Battery (type/position) 1700/middle
Radio ..... Airtronics 3PS
Speed control ..... Novak Atom
Servo ..... Airtronics 158

NOTES

No slipper clutch; Barracuda direct drive; sonic out of the corners.



Christopher Marsh • Team Losi XX4



FRONT SUSPENSION

Front ride height ..... Universal level
Camber ..... -2°
Swaybar ..... No
Toe-in or toe-out ..... 2° toe-in
Front shocks ..... Standard
Oil 40WT
Piston 55
Spring ..... Green

REAR SUSPENSION

Pivot support ..... "CH" 2°
Rear ride height ..... Universal level
Swaybar ..... No
Camber ..... -2°
Wheel-hub position ..... "CH" "A"
Bulkhead position 4
Rear shocks ..... 5-5-4 drilled
Oil 40WT
Piston 55
Spring ..... Red
Limiters (inside/outside) 0.093/0.187

TRANSMISSION & CHASSIS

Tires (F/R) ..... Losi Blockhead Silver/ Losi X-2000 Silver
One-way clicker adjustment ..... Very loose
Motor ..... Handout
Battery position ..... Forward
Pinion/spur gears 22/84

Vincent Nocella • Team Losi XXCR

FRONT SUSPENSION

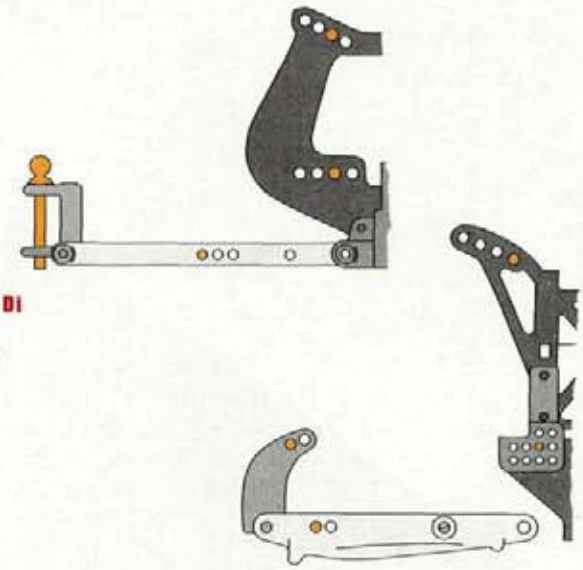
Block carrier (caster setting) ..... 25°
Ride height ..... Arms below level
Camber ..... -2°
Swaybar ..... No
Toe-in/out ..... 0° Note: flipped spindles; XX steering.
Shocks ..... Standard
Oil 30WT
Piston 57
Spring ..... Silver
Limiters (inside) 0.030
Front diagram position ..... Outside, outside, middle

REAR SUSPENSION

Pivot support ..... 2°
Ride height ..... Bones below level
Swaybar ..... No
Camber ..... -2°
Wheel hub position ..... Middle wheelbase
Rear shocks ..... Standard
Oil 30WT
Piston ..... 5-5-6 drilled
Spring ..... Red
Bulkhead position 6

TRANSMISSION & CHASSIS—Double Di

Hydra Drive ..... no
Tires (F/R) ..... Losi Wide-Body Silver/ X-2000 Silver
Chassis ..... Standard
Battery 6-cell
Battery position ..... 3/8-in. back
Transmission 2.19
Motor ..... Handout
Pinion/spur gears 21/84



1998 ROAR STOCK NATIONALS

Truck Stock

Fin.	Qual.	Driver	Chassis	Battery	ESC	Radio	Tires (F/R)
1	3	Eric Pesto	Associated T3	Sanyo 1700	Novak Atom	Airtronics 3PS	Pro-Line Edge M2/Holeshot M2
2	1	Nicholas Lasley	Losi XXT 'CR'	Trinity Ex-Tech 2000	Tekin G9	Airtronics 3PS	Losi Directional Silver/T-2000 Silver
3	7	Richard Trujillo	Losi XXT 'CR'	Peak PowerFlo 2000	Novak Atom	Airtronics 3PS	Losi Directional Silver/T-2000 Silver
4	10	Vincent Nocella	Losi XXT 'CR'	Trinity VIS Matched 2000	Novak Cyclone	Airtronics M8	Losi Directional Silver/T-2000 Silver
5	9	Justin Morrison	Losi XXT 'CR'	Pro-Match 2000	Novak Cyclone	Airtronics 3PS	Losi Directional Silver/T-2000 Silver
6	2	Brian Westerman	Losi XXT 'CR'	World Class 2000	G12C	Airtronics 3PS	Pro-Line Holeshot M2/Losi T-2000 Silver
7	4	Jeremy Aymar	Associated T3	Peak 2000	LRP V6	Airtronics 3PS	Pro-Line Edge M2/Holeshot M3
8	6	Eric Clark	Losi XXT 'CR'	GM VIS 2000	Novak Cyclone	Airtronics 3PS	Losi Directional Silver/Pro-Line Holeshot M2
9	8	Welby Nalls	Losi XXT 'CR'	Wobblized 2000	Novak Cyclone	JR 756 PCM	Losi Directional Silver/Sprint Silver
10	5	Ryan Dawson	Losi XXT 'CR'	Peak PowerFlo 2000	Tekin G12C III	Airtronics 3PS	Losi Directional Silver/T-2000 Red

4WD Stock

1	1	Christopher Marsh	Losi XX4	World Class 2000	GM V12	Airtronics 3PS	Losi Blockhead Silver/Sprint Silver
2	4	Richard Trujillo	Losi XX4	Peak PowerFlo 2000	Novak Cyclone	Airtronics 3PS	Losi T-2000 Silver
3	3	Nicholas Lasley	Losi XX4	Trinity Ex-Tech 2000	Novak Tempest	Airtronics 3PS	Losi Blockhead Silver/X2000 Silver
4	5	Jarrod Hurd	Schumacher Cat 98	Xipp 2000	Novak Cyclone	Airtronics 3PS	Losi Sprint Silver
5	10	Roman Gastelum	Losi XX4	World Class 2000	Tekin G9	Airtronics 3PS	Losi Sprint Silver/Sprint Red
6	7	Eric Larsen	Schumacher Cat 98	Kamikaze 2000	Tekin G9	Airtronics 3PS	Losi Sprint Silver/Sprint Red
7	2	Brian Westerman	Losi XX4	World Class	Novak Cyclone	Airtronics 3PS	Losi Blockhead Silver/X2000 Silver
8	8	Bill Mitchell	Losi XX4	Trinity VIS Matched 2000	Novak Cyclone	Airtronics 3PS	Losi Blockhead Silver/Sprint Silver
9	6	Manee Suebsakul	Losi XX4	GM VIS 2000	Novak Cyclone	JR R-1	Pro-Line Holeshot M2/Holeshot M3
10	9	Nick Malato	Losi XX4	Trinity VIS Extra 2000 Team	Tekin G12	Airtronics M8	Losi Blockhead Silver/X2000 Silver

2WD Stock

1	1	Vincent Nocella	Losi XX 'CR'	Trinity VIS Extra 2000	Novak Cyclone	Airtronics M8	Losi Wide Silver/X2000 Silver
2	2	Justin Morrison	Losi XX Kinwald Edt.	ProMatch 1700	Novak Atom	Airtronics 3PS	Losi Wide Silver/X2000 Silver
3	3	Eric Pesto	Associated B3	Sanyo 1700	Novak Cyclone	Airtronics 3PS	Losi Wide Silver/Pro-Line Holeshot M2
4	5	Welby Nalls	Losi XX 'CR'	Wobblized Cells 2000	Novak Cyclone	JR 756 PCM	Losi Silver Ribbed/X2000 Silver
5	4	Jarrod Hurd	Schumacher Fireblade USA	Xipp	Novak Tempest	Airtronics 3PS	Losi Silver Ribbed/Silver Sprint
6	6	Jeremy Aymar	Associated B3	Peak 2000	LRP V6	Airtronics 3PS	Pro-Line #4M2/Losi X2000 Red
7	7	Eric Clark	Losi XX 'CR'	GM VIS 2000	Novak Cyclone	Airtronics 3PS	Losi Wide Silver/Pro-Line Holeshot M2
8	9	Robert Heacox	Losi XX 'CR'	Maxtec 2000	Novak Atom	Airtronics M8	Losi Wide Silver/Sprint Silver
9	10	Jason Willener	Losi XX 'CR'	Xipp 2000	Novak Tempest	Airtronics CS2P	Losi 4-Row Gold/ Sprint Silver
10	8	Brian Westerman	Losi XX 'CR'	World Class 2000	Tekin G12	Airtronics 3PS	Losi Wide Silver/X2000 Silver

Losi = Team Losi

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Masters Truck

Fin.	Driver
1	Earl Valles
2	Chris Perry
3	Gordon Willardson

Junior Buggy

Fin.	Driver
1	Andrew Cartwright
2	Ken Nelson
3	Michael Petrie

fourth-place finishes to his credit for 193 points. For anyone else to be a serious challenge, Nocella and Morrison would have to fall on their faces, but it was far from locked up for either.

Nocella, Morrison and Pesto broke away early and freight-trained for the rest of the Main. The closest race was between Nocella and Morrison, who were literally inches apart for a good part of the race. As the time wound down, Morrison made a bobble that gave the flawless Nocella the breathing room he needed to coast in for the win and the national championship. Morrison didn't recover completely and was eventually passed by the hard-charging Pesto. He nevertheless secured second overall, and Pesto's second-place finish in the final round allowed him to edge out Welby Nalls for the remaining podium spot.

• **4WD.** The first Main had local racer Christopher Marsh turning in the fastest run with 12 laps in 5:06.09 to win. Nick Lasley and Roman Gastelum filed in behind him to take second and third, respectively.

Round two saw a new face at the front of the pack: Team Losi's Richard Trujillo. He and team driver Matt Francis were on hand to support Losi customers with setup tips and other technical support. He also held a driving seminar in the second round by turning a *perfect* run with the event's only 13-lap effort in 5:23.57.

Trujillo wasn't even in the picture after the first round because mechanical problems forced an early retirement. The whole picture had now changed, and Trujillo posed a serious threat for the win.

Round three set the stage for the Marsh/Lasley/Trujillo showdown. Marsh, Trujillo and Lasley ran in close quarters for the better part of the final round, then Trujillo tubed it and let Marsh and Lasley move ahead. Trujillo clearly had the fastest car, and he drove the wheels off it to get back within striking distance. He managed to get by Lasley, but if he was to catch the super-smooth Marsh, it would be down to the wire. Over the next four or five laps, he closed a nearly 80-foot gap, but time ran out one lap too soon, and Marsh crossed the line for the win and the national championship. An exhausted Trujillo crossed the line ½ second behind Marsh for second overall, and the consistent Lasley took third overall.

• **Truck.** We saw only a couple of new names. Richard Trujillo took the first round by a little less than a 1-second margin over Eric Pesto, and 2WD national champion Vince Nocella took third.

In round two, TQ Nick Lasley showed everyone why he was at the front of the starting grid by taking advantage of what appeared to be the rocket round with a 12-lap run in 5:08.08—the event's fastest truck run. He was followed through the tape by Westerman and Pesto in second and third, respectively.

Lasley and Pesto were tied with 197 points apiece, and Trujillo and Nocella were 1 and 2 points behind, respectively.

The third round wasn't as hectic as the second, but the championship was still wide open. A Pesto/Lasley duel finished in Pesto's favor, and he became the Stock Truck national champion. In the closing laps, Lasley was passed by Justin Morrison and pushed back to third in that round, but he still managed to hang on for second overall, just ahead of Richard Trujillo.

FINAL THOUGHTS

This was one of the best events I've ever attended. Sure, there was the usual

Continued on page 166

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competitive jousting that's part of all national-level competitions, but there was also a strong feeling that drivers were there to have a good time and help one another. The Brockman family and a large group of volunteers went to great lengths to make this event very enjoyable. Every possible challenge tested their resolve, but their efforts never let up. A big thanks go to them from us and, I'm sure, from the participants and spectators as well. Great job!

Thanks also to the event's sponsors and supporters, most important of which are the major companies that showed to help *their* customers. Bob Novak of Novak Electronics, Matt Francis and Richard Trujillo of Team Losi, and Kelly Lunsford of Lunsford Racing all made a tremendous effort to help and support participants.

McGrath Motorsports, which was also a major sponsor, deserves a special mention, too. The man behind the name is simply a Denver area father whose son enjoys R/C racing. Mr. McGrath doesn't make anything related to R/C cars; in fact, his passion is racing big cars. On hearing of the Brockmans' efforts to find event sponsors, he ponied up without hesitation simply because he and his son get so much enjoyment from R/C racing. Needless to say—but I'll say it again—thanks!

Last—and most important—thanks and congratulations to all the racers and their supporters at the Stock Off-Road Nats. I enjoyed being a part of this event; I met a bunch of great people and I look forward to being there again! ■

THE CHAMP'S STOCK MOTOR TUNING TIPS

In the stock class, racers are on equal ground because participants run stock motors—or, at least, that's the theory. Anyone who has raced in stock, however, will tell you that isn't always the way it works out. Motors differ subtly, but what separates the fast cars from the slow ones is motor prep work.

A few subtle changes are within the rules of stock racing, and they will ensure that you get the best possible performance out of your stock motor.

We asked the 1998 ROAR Stock National Champion, Vince Nocella, to show us what he did with the GM Racing Purple Bull hand-out motors that helped him win the Stock Nats.

• Commutator. For starters, Vince checks the commutator to make sure it's true. If necessary, he will make a light cut to true it.

• Brushes. Among the first things Vince changed were the brushes. He swapped the stock brushes for Trinity's® no. 4080NT hard-compound lay-down brushes. These do not have a terminal and are soldered to the brush hoods for maximum efficiency.

• Springs. Stock springs were replaced with Trinity's no. 4389S heavy copper springs. Vince said he obtained the best performance by softening the spring tension on the motor's negative side. To do this, he used a small pair of needle-nose pliers to bend the end of the spring that clips into the brush hood about 15 degrees in a clockwise direction (looking down from the top of the spring as it sits on the motor).

• Break-in. Vince spun the armature with a Dremel tool to break in the bushings, which were rather tight out of the box. Then, he ran the motor for about 10 minutes, powered by a 4-cell pack, to seat the brushes.

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Grand Island, NE	(308) 382-3451
La Vista, NE	(402) 597-1888
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Omaha, NE	(402) 498-8888
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Austin, TX - South	(512) 440-7877
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Plano, TX	(972) 758-7875
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Sheboygan, WI	(920) 452-0801
Cross Lanes, WV	(304) 776-7259

www.hobbytown.com

YOKOMO YR-4M2 USA

(Continued from page 62)

highly recommend that you install them if you plan to race in heated competition. I opted to install a set of MIP* Shiny CVDs instead; again, problem solved.

Finally, I had to rebuild the rear diff after about a dozen battery packs, and the front diff needed rebuilding a few battery packs later. I felt the time for rebuilding arrived sooner than what is considered normal. No problem; thanks to its smart design, the M2's diffs are easy to access. I rebuilt the diffs using Associated* 3/32-inch carbide diff balls, 5/64-inch thrust balls and hardened-steel thrust washers. I also used Associated Stealth diff lube on the diff balls and Black Grease on the thrust washers.

The rest of the testing took place with a nasty, Reedy 10-turn TC-1 modified motor strapped onto the motor mount. With the modified motor in place, the excitement level went up several notches. Unfortunately, the frustration scale went up a few notches at the same time. Although the car was silly-fast, the stock tires weren't providing enough traction and the Yokomo RX7 body just wasn't providing enough downforce for the horsepower I was running; not to mention that my setup was also completely wrong!

Most of the racers at the track race with an Andy's* Stratus body on their cars. I decided to go with the flow and installed a Stratus on the M2 USA. I then installed a complete set of Yokomo Inch Up wheels with a set of Sprint tires in the firm compound all the way around (all the tires were equipped with Yokomo molded foam inserts in the medium compound). This was considered "the hot tire setup" by most of the Yokomo drivers who race at So Cal. Unfortunately, this made the car feel as if it was riding on metal skates; it was much too loose for my driving style. I later switched to medium compound tires with medium molded inserts in the rear, which suited my driving style much better.

I then installed four additional aluminum chassis posts (for a total of six) between the upper and lower decks to remove some of the side-to-side chassis flex. This made the car feel much more responsive when cutting through traffic and going through the corners. I also loosened the upper chassis coil spring to allow the chassis to flex a little more toward the front, which added a little more steering. At this point, the car was a rollercoaster and was locked to the track surface. Transitions were smooth, handling was extremely predictable and the car sucked up the horsepower and asked for more. This is one dialed touring car!

FINAL THOUGHTS

In "USA" trim, the YR-4M2 is more tunable and provides more consistent handling, thanks to its larger capacity shocks. The softer material used in molding the suspension arms showed a little too much flexing in the modified class, making more rigid suspension arms high on my wish list. One of the most significant aspects of the car has not changed, however, and that is that the chassis and suspension remain highly tunable. Out of the box, the M2 USA can do well in the stock class; with a few smartly placed hop-ups, it can be a terror in the modified class. Either way, the Yokomo YR-4M2 USA could be your ticket to the A-main.

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

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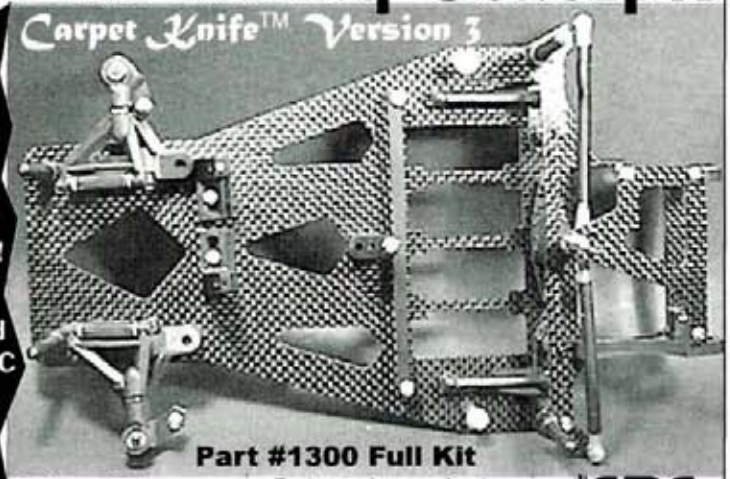

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HOW TO REBUILD YOU

This well-used Thunder Tiger engine was over-revved, until its connecting rod snapped.

EASY STEPS FOR LIKE-NEW PERFORMANCE

WHEN WILL I need to rebuild my engine, and how will I do it? These are the questions that most nitro enthusiasts have at the backs of their minds. I'm here to answer them.

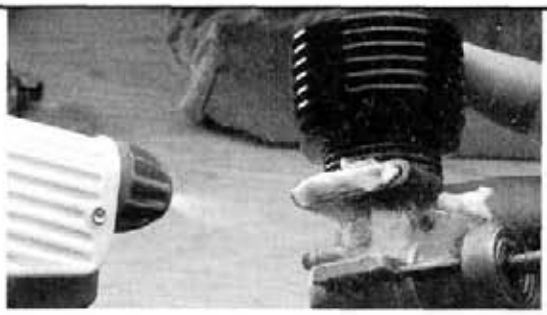
Have you noticed a loss in power or rough idling, or has your engine stalled as it returned to an idle? Perhaps tuning has become increasingly difficult? If you answered "Yes," chances are your engine is due for a rebuild.

Rebuilding a nitro engine isn't rocket science, but you have to approach it with care. No special tools are required—only patience, time and a clean, well-lit work area. In this article, I'll show you how to change the piston and sleeve and tell you which signs of wear you should look for on the piston rod and wristpin.

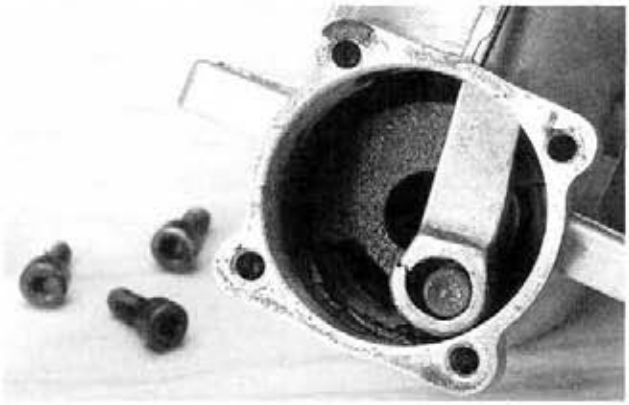
DISASSEMBLY

1 GET CLEAN.

After removing the engine from the chassis, clean it as well as you can. A squirt bottle filled with denatured alcohol from a hardware store, a couple of old rags and a toothbrush are all you need. Stuff a piece of paper towel into the carburetor venturi and exhaust port because you don't want dirt to get inside the engine and carburetor. Clean the outside of the engine thoroughly with denatured alcohol to remove all the dirt so that it doesn't have a chance to get into the engine when you disassemble it. Remove the flywheel assembly and carburetor, and clean them thoroughly before putting them aside.



Denatured alcohol is an excellent solvent for cleaning nitro engines.

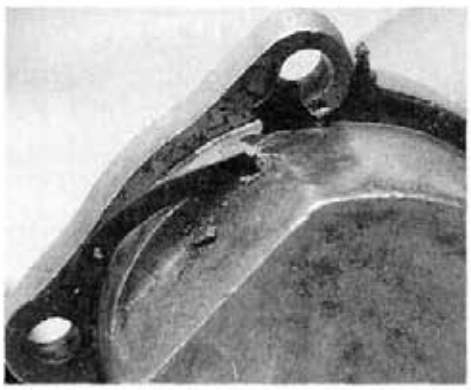


This is typically the result of a car's going out of control with the engine revving wildly. The lower end of the connecting rod is stretched to a point at which it snaps, and that sends rod and bushing fragments through the engine.

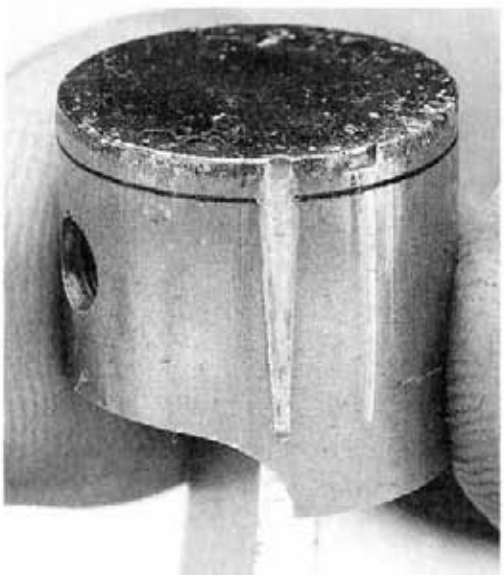
2 REMOVE THE HEAD AND BACKPLATE.

Four Allen-head screws hold the head on the engine block, and because manufacturers typically use thread-locking compound on them, they can be rather tight. Having removed these screws, lift off the head, taking care not to lose the very thin metal shim that goes between the head and the engine. The shim may stick to the bottom of the head and look like a part of it.

Remove the screws that hold the backplate in place, being careful to avoid ripping or losing the gasket that seals the plate to the block.



Inspect the backplate gasket to ensure that it can still provide a proper seal.



This piston and sleeve from a second engine have been badly scored by debris and will have to be replaced.

.12-SIZE NITRO ENGINE

by BRIAN LESLIE

REMOVE THE SLEEVE AND PISTON.

3 Check to see whether the sleeve is "indexed" to the crankcase (a vertical pin in the block lines up with a notch in the top of the sleeve to ensure proper orientation). If it isn't indexed, note the direction the ports are facing before you remove the sleeve.

With the sleeve removed, rotate the crankshaft until the piston is all the way at the bottom of its stroke. Now put your finger into the sleeve and pull it up; the sleeve should just slide out on your finger. If it doesn't, try to push it up by poking a finger through the open backplate and pressing up on the bottom of the sleeve. At the worst, you'll only need to use pliers to grab the outer edge of the sleeve to remove it. If you use pliers, you might damage the sleeve and then have to replace it, so try any other means possible if you plan to reuse the sleeve. Avoid scratching the surface of the engine block around the edge of the sleeve.

To ensure the proper piston orientation when you reinstall it, before you remove it, use a permanent marker to make a mark on the top of the bad piston pointing toward the exhaust port. This will help you reinstall it correctly.

You should now be able to reach into the engine block and remove the connecting rod from the crankshaft through the open backplate. If you can't grab the rod by hand, use a pair of needle-nose pliers wrapped in tape or cloth to avoid scratching anything inside the engine block. Pull the rod toward you and slide it off the crankpin. Turn the engine upside-down, and let the piston and rod assembly slide out of the top.

ASSEMBLY

Before assembling the engine, check the connecting rod for excessive wear. Place it on the crankpin, and check for slop; it should feel tight—nearly zero slop. If the rod can move up and down on the crankpin, it's time to replace the rod. If the rod is no good, the wristpin should also be replaced. For a few extra bucks, you can replace all the internal components at one time, and it's worth it.

Thoroughly clean the engine block and all new and reusable parts with denatured alcohol or engine spray (available through HPI*). Use a lint-free towel or cloth to wipe down everything; this is vital. Any foreign matter in the engine could spell disaster.

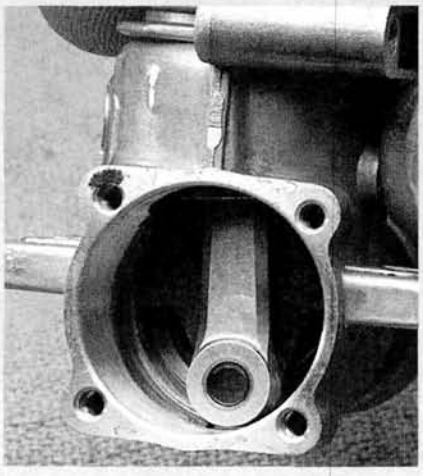
INSTALL THE CRANKSHAFT.

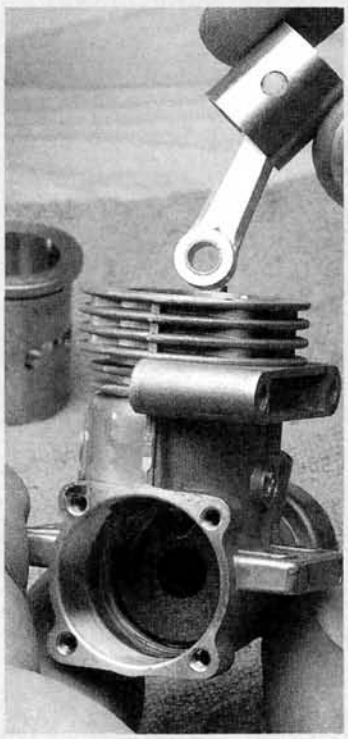
1 Put a little Pacer* after-run oil onto the crankshaft, and then slide the shaft into place, making sure it spins freely in the bearings.

INSTALL THE PISTON AND ROD.

2 Coat all the parts with after-run oil. Assemble the connecting rod, wristpin and piston. When installing the new piston on the rod, check the mark you made on the old piston. If your old connecting rod is still usable, it's best to reinstall it in exactly the same position as the old one. Bushings tend to develop a wear pattern that is consistent with the engine's rotation. If your old connecting rod is still usable and you install it 180 degrees from its original position, it will soon wear, and you'll have to do all this again—sooner than you'd like.

When you slip the piston/rod assembly down through the top of the block, make sure the holes in the new piston skirt are in the same place as the holes in the old piston were. Use your fingers or wrapped needle-nose pliers to put the rod back on the crankshaft pin.





Before you attempt to install the backplate, make sure the connecting rod is completely seated on the crankpin.

BREAK-IN FOR BEST PERFORMANCE

Now that your engine is "like new," treat it like new by breaking it in properly. This is vital to the longevity of any engine. Here are general guidelines, but the best procedure is the one outlined in your engine manual.

1. Set the main needle valve. Screw your needle valve in (clockwise rotation) just until it stops. DO NOT overtighten it; these valves strip easily. Now back it out (turning counterclockwise) approximately three full turns. This is usually a very rich setting that delivers excessive quantities of fuel and oil to the engine to ensure that all the engine's internal parts will be well-lubricated and will run cool during initial break-in. For additional cooling during break-in, you may want to run your vehicle without a body to allow the engine head to be constantly cooled with fresh air.

2. Run the engine. You should constantly see a lot of smoke coming out through the exhaust pipe. If you don't, stop and back the needle valve out another ¼ turn. The object is to get as much oil and fuel through the engine as possible without causing it to run erratically. There will be a noticeable loss of power and speed, but this is normal.

Run at least three tanks of fuel through the engine in this way. On the fourth tank, you can start to lean out the engine by turning the needle valve clockwise to tighten it, but do not make more than ⅛ turn adjustments at a time.

Leaner fuel mixtures can provide a slight improvement in performance, but this gain might be at the risk of damaging the engine.

It's very important to have the engine at running temperature before you make any final mixture adjustments. This doesn't mean that you should just putz around for a couple of minutes; run the engine *hard* for at least 4 or 5 minutes. Continue to turn the main needle clockwise ⅛ turn at a time, allowing about 30 seconds between adjustments. As soon as you have a really snappy throttle response, STOP! This is the ideal setting, both for performance and longevity. Roar on!

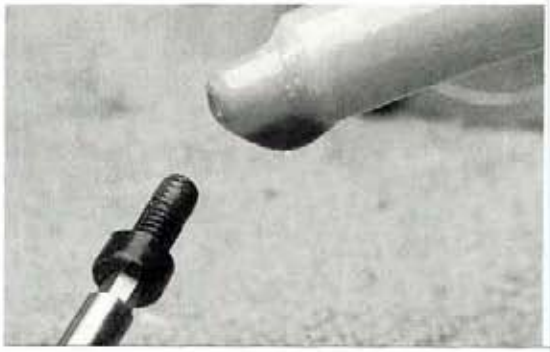
INSTALL THE HEAD.

3 Put the head back on the engine block. With most heads, orientation doesn't matter, but if you have a head with vertical fins, make sure the fins run in the direction that the airflow will take when the vehicle is running.

Screw all head screws into place, but *DO NOT tighten them yet.* When you tighten the head screws, follow the proper sequence to ensure uniform pressure at all points where the head contacts the sleeve. Tighten the head screws in three steps, increasing the torque each time you go through the sequence. Do not use a wrench or a pliers on the Allen wrench to get more leverage for the final tightening of the head screws. Hand-tight is just right.

You can use the old shim(s), but for the best possible seal between the head and the piston sleeve, use a new one there.

Coat the sleeve with after-run oil for easier reinstallation



Here, a dab of Loctite will prevent this backplate screw from loosening.

4 INSTALL THE BACKPLATE.

If the gasket is worn or ripped, replace it. In a pinch, you could use red Permatex RTV (no. 27B) in place of a gasket, but I *highly recommend that you use a gasket.* Important: certain types of silicone sealant can corrode the inside of a nitro engine. If using silicone is your only available option, make sure it's non-corrosive, i.e., that the directions indicate it's safe to use on automotive oxygen sensors

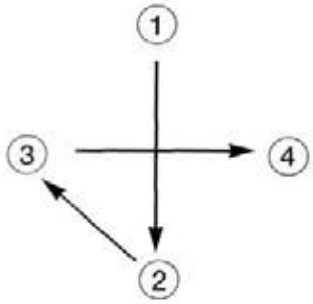
5 INSTALL THE CARBURETOR.

The carb is a common source of air leaks. When you install the carb on a rebuilt engine, if it isn't obvious that there will be a good seal in this area, be sure to seal it to the engine block. A hardware-store O-ring will be enough for this; it should be about 1/16 inch smaller than the carb base, and it should have a cross-section of about 1/32 inch.

You now have a "brand-new" engine and, hopefully, a better understanding of how it works. Make sure you follow the proper break-in procedures with your new piston and sleeve. Your "new" engine needs to be treated like a new engine. Remember that the more smoke there is coming out of the exhaust pipe during the break-in, the better.

**Addresses are listed alphabetically in the Index of Manufacturers on page 225.* ■

When tightening the head and backplate bolts, follow the sequence shown. This will ensure even tightness and a "square" fit against the crankcase.



Torque sequence

PRODUCT watch

Need to know what's new? What works well and what doesn't? This section is devoted to objective reviews of all R/C car accessory items. From gears and wrenches to motor brushes and shock springs; if you can use it with your R/C vehicle, you'll find it critiqued on these pages.

198
Schumacher CCD 2000 Charger

200
Roland Stika Design Cutter

202
DuraTrax XL Field Bag

SCHUMACHER
CCD 2000 Charger
Reliable, multi-mode charger

The CCD 2000 is feature-packed, yet simple to use. The large heat sink obviously works; it gets hot! The analog ammeter does the job, but a digital meter would have been nice.

Along with "Use the right tool for the right job," one of my favorite aphorisms when speaking of all things mechanical or electronic is "If you buy cheap, you buy twice." I wish I had heeded this when I first started out in the hobby; for what I have spent on a variety of crummy (but cheap) mechanical chargers and add-on peak detectors, I could have just bought one decent charger—such as the Schumacher* CCD 2000 featured here. A reliable charger adds more enjoyment to electric R/C; it's a good feeling when you're sure of a good charge every time, instead of finding a cold, false-peaked pack on the charger minutes before the Main. Of course, Schumacher designed the CCD 2000 to be much more than a reliable charger—let's check it out.

FEATURES

The CCD 2000 operates in a few different modes as suggested by "CCD," which stands for charge/cycle/discharge. Here's how those modes operate:

• **Charge.** The CCD 2000 does more than just dump the juice in. A dial allows the user to select the charging amp rate (1 to 8 amps). Once a charge cycle has started, the unit checks the pack to make sure its voltage is increasing and registers "FAIL" if the pack is not accepting a charge. If all is well, the charger disregards any voltage drop for the first 90 seconds of the charge cycle to help prevent false peaking, then continues to monitor the pack for the peak charge. Once a voltage drop of 10mV over 10 seconds is detected, the CCD 2000 stops charging. This is a "delta" peak; delta is the Greek symbol for change, and a delta peak charger looks for a change (a drop) in voltage. Get it?

• **Flex charge.** The CCD 2000 can also be set to "flex" charge. Short discharge pulses are applied during the charge cycle to help condition the batteries for best performance and potentially revitalize "tired" packs suffering from crystallized material built up within the cells.

• **Cycle.** It's well known that Ni-Cd packs provide longer run times and more "punch" after they have been "cycled" (charged and discharged) a number of times. The CCD 2000 can be set to charge (at the user's selected amp rate) and discharge (at 6 amps) the connected pack up to 99 times. Most packs benefit from 10 or fewer cycles, so 99 is more than enough.

SPECIFICATIONS

Charging capacity—1 to 7 cells.
Charge current—1 to 8 amps (adjustable).
Discharge current—6 amps.
Input voltage—DC only (15V maximum; 12V minimum).
Peak method—delta.

• **Discharge.** The CCD 2000 will dump a pack at 6 amps until its voltage drops below 0.5 volt. This is a low amp rate for conditioning packs (popular wisdom holds that a rate closer to "race pace"—20 to 25 amps—is best), but the built-in discharger is ideal for draining off residual power after a run.

• **Display.** After completing a charge cycle, the CCD 2000's digital display will show the charge time in minutes, amp hours of the charge (which indicates the capacity of the pack as the amperage the pack can deliver for 1 hour), and peak voltage at cutoff.

After a discharge cycle, the unit displays the pack's capacity in amp hours and discharge time at 20 amps (extrapolated from the discharge time at 6 amps), and it also calculates a "punch factor" that is determined by comparing the voltage while discharging with the no-load voltage to determine the pack's impedance. Here's the short version: the larger the "punch factor" value, the punchier the pack.

DOES IT WORK?

Schumacher claims the CCD 2000 was designed for "the latest 2000mAh cells," and I charged plenty during my test of the unit. I also ran through a few charge cycles with some ancient, gosh-awful 1300mAh sport packs that represent my personal acid test for false peaking. The CCD 2000 never "falsed," so it passed the reliability test. The discharge and cycle functions also performed as promised.

My only problems with the unit involved the digital display and the analog ammeter; the LED display is almost impossible to read in direct sunlight, and the ammeter's needle bounces with each pulse of energy from the charger. Neither problem is of deep concern; it's easy enough to shade the digital display and take the ammeter reading from the midpoint of the area swept by the needle. All told, a solid, reliable charger.

—Peter Vieira

LIKES
- Plug in the battery; push the button; the battery is charged—every time.
- Cycles and discharges packs.
- Flex-charging option.

DISLIKES
- Hard to read display in sunlight.
- Bouncing ammeter needle.
- Non-adjustable discharge current.

PHOTOS BY WALTER S. OAS

The Roland STIKA Plus Design Cutter is compact enough to fit on any desk, but with the optional SignMate software, it peforms like one of the big, expensive, commercial units.

ROLAND STIKA
Design Cutter
Digital Decals

Will the Roland STIKA* Design Cutter add even 1mph to your car's top speed? Will it increase your car's run times or make you a better driver? No, not really, but if you're an R/C enthusiast who takes your car's appearance as seriously as you take its performance, this is one of those "peripheral" R/C devices that once you've used it, you'll wonder how you ever did without it.

The Mark Martin-esque paint on this Protoform Taurus was relatively easy to apply with the use of the STIKA. Note the "weeded" paint masks of the flyaway "A" graphics in the foreground.

Special low-tack transfer tape is available to help you peel the cut-out graphics off their backing sheet, but regular masking tape will do in a pinch.

Position your graphics on the body, burnish them down through the application tape, and then carefully peel the tape away. You can do this on the inside or the outside of the body.

The Roland STIKA is a handy, desktop vinyl cutter that hooks up to your home computer and enables you to create precision-cut names, sponsor's logos, paint masks, or any other image you want for your car's body. It comes with Roland's "Dr. STIKA" software—the "brain" that tells it what to do, and it's easy to install on any PC running Windows 95 (or later). I highly recommend the optional Roland SignMate STIKA software; it's all you'll probably ever need to create custom logos and graphics. If you're already familiar with illustration programs such as Adobe Illustrator, CorelDRAW, or FreeHand, you can create your design with any of these programs and import it via the "merge" option into SignMate for cutting. You can use over a dozen kinds of image files, such as PICT, JPEGS, or TIFFs, and even use scanned-in graphics.

But enough of the techno-babble. Here's how it works. Open the program, type (or merge) whatever you want to make a sticker of, roll a piece of vinyl sheet into the STIKA machine, and select "cut/plot" from a pull-down menu. In just seconds, the STIKA cuts out your design. I'm no computer whiz, but if I can hack through the program in a single morning and actually use the STIKA that afternoon, then you can do it; it's that user-friendly.

With a quick look in the phone book, I located a commercial sign supply shop that sold 15-inch-wide, self-adhesive, vinyl sign material in over two dozen colors—solids, fluorescents, metallics, foils and more! This stuff is $5 to $8 per yard, but you can make a lot of R/C-car logos from one yard! If you just want to create paint masks with the STIKA (for masking off your car's windows and painting custom graphics), you can stick with inexpensive, white masking vinyl. If you can't find vinyl locally, Roland offers it in 10 colors, precut to fit the STIKA machine.

LIKES
- **Quickly and easily creates custom decals and graphics.**
- **Vinyl material makes excellent painting masks; the possibilities are limited only by your imagination.**

DISLIKES
- **The STIKA's price makes it a more likely purchase for a club or track than for an individual.**

If you paint a lot of bodies, the Roland STIKA can be an incredible time-saver. Just slicing out a simple pair of NASCAR numbers with a hobby knife can take you up to half an hour, but the STIKA can handle it in about a minute. Small letters, down to about ¼ inch, are cleanly and easily cut out, and the STIKA will even put a "weeding" border around them to make removal of the excess vinyl easier. (OK; I'll explain it: "weeding" is sign-shop parlance for the removal of excess vinyl from the outsides of graphics and insides of letters such as "O" and "P.") Complex paint schemes such as checkerboard patterns, flames, or scallops are a piece of cake. Did you see the no. 6 Mark Martin-style paint scheme I created for Associated's new RC10L30 car box? The flyaway "A's" would have taken days to hand-cut, but I cut out all the graphics in about an hour. In fact, I wouldn't even attempt some designs without a vinyl cutter such as the STIKA. How about perfect mirror-image "tearaways"? Yikes! This machine blows the doors wide open to try all sorts of previously impossible ideas!

The cutting head uses a tiny razor blade to cut designs into the vinyl.

Hobby club members could use a jointly purchased STIKA to make graphics for the entire team. Shops and tracks equipped with a Roland STIKA could use it to make signs, logos and custom graphics for their customers for a few bucks.

The top-of-the-line Roland STIKA shown here retails for about $699, which definitely qualifies it as a high-end R/C accessory, but after using it for a few weeks, you'll never go back to tediously hand-cutting numbers or sponsor logos. If you'd rather be out practicing your racing lines than masking and decaling your car's body, the STIKA can help you get on the track a lot quicker; so maybe the Roland STIKA is a speed secret!

—Mike Ogle

Part nos. and prices—Model STX-8 (for 12-inch-wide materials), $699; STX-7, (for 8-inch-wide materials), $499. SignMate STIKA software, $199 (Windows); $249 (Mac).

MINIMUM SYSTEM REQUIREMENTS

486 processor.
Windows 95 or later (PC); Power PC processor/System 7.5 or higher (Mac).
Parallel port for connection.
50MB hard-disk space (20MB for SignMate, 25MB recommended for files).
Supports TrueType and Type 1 Postscript fonts with ATM.

PHOTOS BY WALTER SIDAS

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DURATRAX

XL Field Bag

Hardware haulers

Are you still heading out to the track each Sunday with all your gear packed into a box that's a refugee from the fishing department at Wal-Mart? I confess that was my tool and gear storage mode for a long time, too. Then I got hip to the bag scene, and life got easier. I could carry more, more easily. Everything fit—even my car and transmitter. If you haven't made the leap from plastic and latches to fabric and zippers, DuraTrax* has a couple of new items you'll want to check out: the XL Field Bag (part no. DTXP2000; $29.95) and the XL Deluxe Field Bag (DT XC2010 XL; $49.95).

The XL Field Bags are made of 420-D nylon, which DuraTrax says is tear- and puncture-resistant, and both feature reinforced interior compartments to prevent that lumpy, sagging look. (I'm talking about the bag; if you're lumpy and sagging, that's your problem.) To give the bags a good test, I've been hauling my stuff around in them for about a month. No problems so far: no rips or tears; the handles are still attached; the zippers still work. On the downside, the shoulder straps are a little narrow; loaded for bear, I felt as if my arm might be severed by the shoulder strap.

LIKES
- Holds plenty.
- Makes it easy to carry a lot of gear.
- Conservative red-on-black styling.
- Shoulder strap included.

DISLIKES
- Nylon feels thin (no problems experienced, however).
- Shoulder straps need to be wider, or equipped with a pad.

All in all, the XL bags are reliable and rugged; they're tougher than their somewhat thin nylon might lead you to believe. If all you want is to transport a few tools, your car, your transmitter and some batteries to the parking lot or playground, get the XL. For the dedicated racer (or hardcore equipment junkie), the XL Deluxe is the way to go.

—Peter Vieira

Both the XL Deluxe Field Bag (top) and XL Field Bag (left) have shoulder straps and a reinforced construction.

PHOTOS BY WALTER SIDAS

*Addresses are listed alphabetically in the Index of Manufacturers on page 225. ■

Track Directory

FREE! Track owners! You can be included in this directory brought to you by Pro-Line. Just fill out the coupon on page 245.

YOUR 1998 TRACK GUIDE

Key to Symbols

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

ALABAMA

Beacon Point RC Raceway, 15717 Beacon Point Drive, Tuskaloosa, AL, 35406; Don, (205) 333-8679

Hobbytown USA Raceway, 450-Q Schillinger Rd. N., Mobile, AL 36608; Rob & Kari Baker, (334) 633-8446

Lagoon Park R/C Raceway, 2730 Lagoon Park Dr., Montgomery, AL 36109; Alex Love, (334) 272-6438

Phenix Raceway & Hobby, 2006 Opelik Rd., Phenix City, AL 36867; Chris Watson, (334) 298-9786; http://www.xoom.com/PhenixHobby

R/C Hi-Tech Raceway, 3303 Meridian St., Huntsville, AL 35811; Rick Chambers, (205) 539-1347.

R/C Thunder Tracks, 1530 Schillinger Rd., Mobile, AL 36675; for mail, use 8125-2 Moffett Rd., Semmes, AL 36575; Jerry Hurst, (334) 645-2787

ALASKA

Fairbanks R/C Car Club 510 Juneau Ave. Fairbanks, AK 99701; Dan Anderson, (907) 456-5494

ARIZONA

Cottonwood R/C, S. 6th St., Cottonwood, AZ 86322; Sal Cirincione, (520) 567-6830

Havasu R/C Raceway, 1400 S. Smoketree (Rotary Park), Lake Havasu, AZ 86403; Jeff Roe, (520) 855-2226

HobbyTown Mountain Raceway, 1500 E. Cedar Ave., Cedar Hills Shopping Center, Flagstaff, AZ 86004; Richard, (520) 214-9887

HobbyTown Raceway, 13802 N. Scottsdale Rd, Scottsdale, AZ 85250; (602) 948-3946

HobbyTown Raceway, 1915 East Baseline Rd., Gilbert, AZ 95234; Dennis, (602) 892-0405

Hobbytown Raceway, 1102 E. 22nd St., Tuscon, AZ 85704; (520) 882-8888

HobbyTown U.S.A., 5030 E. Ray Rd., Phoenix, AZ 85044; Linda McFarland, (602) 598-5282

Quarter Flash's Squirtin' Dirt Raceway, 16301 S. Santa Rita #C, Sahuarita, AZ 85629; Dave,(520) 625-9274

R/C Sports Mania, 3550 N. 35th Ave., Phoenix, AZ 85017; Brian Dick, (602) 278-3671

Scottsdale R/C Raceway, 3023 N. Scottsdale, Scottsdale, AZ 85251; Scott Anfinson, (602) 945-2186

Speedway Hobbies, 2710 N. Steve's Blvd., Ste.8, Flagstaff, AZ 86004; Gary McAllisteer, (520) 714-1566

Thunder Mountain R/C, 1325B Plaza Mavia, Sierra Vista, AZ 85635

ARKANSAS

Arkansas R/C Car Association, 101 W. 52nd St., N. Little Rock, AR 72118; William Byrd, (501) 753-1286

Airport Speedway, 1521 Airport Loop, Rogers, AR, 72756; Mike Dollar, (501) 636-7123

Grand Slam Superspeedway, 5300 S. Zero St., Ft. Smith, AR 72901; Bryon Shumate, (501) 648-1994

Hobby Town USA, 356 E Joyce, Fayetteville, AR 72703; Darrell Irvin, (501) 571-3730

Sparks R.C. Raceway, 7194 Greene 721 Rd., Paragould, AR 72450; Tommy Sparks, (501) 239-3606

CALIFORNIA

California City R/C Car Track, 8349 Jacaranda Ave., California City, CA 93505; (760) 373-3765

Cameron Park Raceway, 1305 Cameron Ave., West Covina, CA 91790; Carl A. McVey, (818) 962-1120

Castle Hobbies, 14918 Camden Ave., San Jose, CA 95124; (408) 377-3771

Cats West/Hawk's R/C Raceway, 1201 West 10th St., Antioch, CA 94509; Mike Rogers, (510) 779-1665

Cycle Art Raceway, 2211 N. Pleasant Way, Fresno, CA 93705; Jesse Shapiro, (209) 233-3665

Discount Hobby Warehouse, 7750 Convoy Ct., San Diego, CA 92111; (619) 560-9633

Freedom Park Raceway/Ventura Roadrunners, Freedom Park Dr., Camarillo, CA 93010; Chris Jones (805) 656-RACE

Greater Los Angeles R/C Racing Club, 3756 Cardiff Ave., #305, Los Angeles, CA 90034; Nikko Ko

Hobby Central Raceway, 34255 P.C.H., Unit 107, Dana Point, CA 92629; John, (619) 513-0373

Hobby Central II Raceway, 13461 Community Road; Poway, CA 92064; John, (619) 513-0373

Hobby Paradise Raceway, 1880 Art Gonzales Pkwy., Selma, CA 93662; Steve Keiser, (209) 896-4804

HobbyTown, Parktown Plaza Shopping Center, 1350 S. Park Victoria Dr. #21, Milpitas, CA 95035; (408) 945-6524

Hobby Warehouse, 8950 Osage, Sacramento, CA 95828; Roger Hubbard, (916) 381-7587

Hot Rod Hobbies, 25845 San Fernando Rd., #21, Saugus, CA 91350; Rod Weisbaum, (805) 255-2404

Jake's Performance Hobbies, 6650 Commerce Blvd. #21, Rohnert Park, CA 94928; Jake, (707) 586-3375

Just for Fun R/C Raceway, 509 S.State St., Ukiah, CA 95482; Don, (707) 462-7305

K&M Raceway, 22474-A Barton Rd., Grand Terrace, CA 92313; (909) 783-0899

Lake Tahoe Raceway/Sierra Hobbies & Raceway, P.O. Box 9969, South Lake Tahoe, CA 96158; Mark Osser or Greg Smith, (916) 541-4555

Lucerne Valley Raceway, 32800 Old Woman Springs Rd. #4. P.O. Box 2047, Lucerne Valley, CA 92356; Frank Rodrique, (760) 248-7305

M n M Hobbies, 4225 Prado Rd., Ste. 103, Corona, CA 91720; Joe Stanovich, (909) 272-3545

M.R. C.A.R., McGreed Loop, Merced Airport, Merced, CA 95340; (209) 723-6662

Nor-Cal Mini-Speedway, 519 Bush St., Woodland, CA 95695; Steve Van Atta, (530) 668-5678

Perris Recreation R/C Track, 120 N. Perris Blvd., Perris, CA 92370; (909) 943-6603

R/C Veladrome, P.O. Box 2403, Julian, CA 92036; Peyton Read, (760) 765-3463

R.A.C.E., 724 Mangrove Ave., Chico, CA 95926; HobbyTown U.S.A., (916) 899-2977

Race Corner of Marin, 14 Commercial Blvd., #111, Novato, CA 94949; Mike, (415) 883-0388

Race Prep Raceway, 20115 Nordhoff, Chatsworth, CA 91311; Steve Dunn, (818) 709-6800

Racer's Haven Raceway, 7401 White Lane #12, Bakersfield, CA 93309; Martin Buchannan (805) 835-0441

Radio Control Products, 201 E. Magnolia Blvd. #148, Burbank, CA 91502; Tab, (815) 846-4208

Rams 1/8-scale Gas and 1/10 scale Gas On-Road, Mission College, Lot B, 3000 Mission College Blvd., Santa Clara, CA 95054-1897;Steve Tsuruda, (415) 675-5609

Ranch Pit Shop, 1655 E. Mission Blvd., Pomona, CA 91766; Ken Shintani, (909) 623-1506

Ripon R/C Speedway, 701 N. Acadia Ave., Ripon, CA 95366; Dan Tanis, (209) 599-5160

R.O.C.K.S., 2525 N. Texas St., Fairfield, CA 94533; Mike Learn, (707) 447-0492

Simi Valley Groundpounders, 392 C - East Easy St., Simi Valley, CA 93065; Jack Kasten, (805) 584-8211

So. Cal R/C Raceway, 19118 Brookhurst St., Huntington Beach, CA 92646; Jim Blauvelt, (714) 963-7484

S.R.S Offroad Raceway, 1038A N. Davis Rd., Salinas, CA, 93907; Randy Loveless, (408) 424-4044

Team Air Racing Club, 18208 Imperial Hwy., Yorba Linda, CA 92686; Don or Nicky, (714) 579-7488

Track Heaven, 6196 Child's Ave, San Diego, CA 92139; Loure, 475-2020

Tri-Valley Auto Racers, Livermore Elks Club, 940 Larkspur, Livermore, CA 94550; Mike Stone, (510) 455-6833

Ultimate Hobbies, 2378 North Orange Mall, Orange, CA 92865; Cliff Murukami, (714) 921-0424

Valley R/C Racepark, 146 S. Santa Fe St., Hemet, CA 92344; Valley Wide Recreation, (909) 925-9331 or (909) 654-1505.

COLORADO

MHOR R/C Raceway, 15540 East Batavia Dr., Aurora, CO 80011; Jess Brockman, (303) 343-0151

S&T R/C Raceway, 323 Auburn Dr., Colorado Springs, CO 80909, Tim Bishop, (719) 574-2910

Valley West R/C Club, 2202 I Road, Grand Junction, CO 81505; Waymond Williams, (970) 242-8846

CONNECTICUT

Central CT Auto Racers, Davis Hobbies II, 45A Welles Street, Glastonbury, CT 06033; (860) 633-3056

East Lyme R/C Kar Klub, Society Rd., East Lyme, CT 06333; Howard Estorm (203) 483-9201

K/N R/C Speedway Inc., West St., Stafford Springs, CT 06076; for mail, 44 Clearview Rd., Moodus, CT 06469; (860) 684-9896

Racing and Entertainment Center, 29 Olcott St., Manchester, CT 06040; Peter Tierinni, (860) 643-4768

R/C Madness, 640 Enfield St., P.O. Box 64, Enfield, CT 06082; Christopher Marcy, (860) 741-6501

Xtreme Radio Control, 469 Danbury Rd., New Milford, CT 06776; Paul or Pete, (860) 354-4703

DELAWARE

DARCAR Club, Blue Hen Corporate Center, Rte. 113, Dover, DE, 19901 Steve, (302)-697-8350.

Eastcoast Off-Road, Rt. 3 Box 256 A, Laurel, DE 19956; Darrin Shockley or Steve Nelson, (302) 875-8160

The Hobby Outlet: Tracks of the Outlet, Salisbury Rd., Dover, DE 19901; Steve, (302) 697-8350

Hobby Stop Speedway, RD4, Box 100, Rte. 13, Seaford, DE 19973; Remy Haynes, Jr., (302) 629-3944

FLORIDA

B+T R/C Central, 811 Playground Rd., Ft. Walton Beach, FL 32547; (904) 863-1666

Branford R/C Speedway, Rt. 3, Box 240, Branford, FL 32008; (904) 935-0758

Broward County R/C Race Club, Mills Pond Park, Ft. Lauderdale, FL; Ed Decembero, (954) 525-3304

Burton's R/C Raceway, 4215 Mustang Rd., Lakeland, FL 33803; Louie Burton, (941) 665-1322

Coral Springs Roadrunners, P.O. Box 9632, Coral Springs, FL 33075; John Argentino, (954) 925-8284

First Coast Speedway, 6410 Waltho Dr., Jacksonville, FL 32211; Bob Thompson, (904) 743-2161

5-Fifty-5 R/C Raceway, State Road 555, Bartow, FL 33830; John Goepferich, (941) 678-9111

Frontier Race Track, 15260 N.E. 244th Ave., Salt Springs, FL 32134; Harold Reel, (352) 685-2881

GggGggGnnnnnG& C Hobbies 1228 Hypoluxo Rd. Lantana, FL 33462; George, Debbie, or Carol, (561) 547-3812

Gainesville R/C Speedway, P.O. Box 693, Melrose, FL 32666; 130 NW 14th Ave., Gainesville, FL 32601; (352) 495-3600

G & C Hobby Raceway, 1228 Hypoluxo Rd., Lantana, FL 33462; George, 561-547-3812

Greater Orlando Auto Racers, 970 Keller Rd., Altamonte Springs, FL 32714; Rob Michael, (407) 834-9299

Hobby World Raceway, 7273 103rd St., Jacksonville, FL 32210; Greg, (904) 772-9022

The Hobby Stop Raceway, 5765 Manatee Ave. W., Bradenton, FL 34209; Rich Konnen, (941) 798-9638

The Hobby Stop Raceway, 2454 Land O'Lakes Blvd., Land O'Lakes, FL 34639; Rich Konnen,(813) 948-0606

Miami R/C Raceway, 12546 S.W. 88 St., Miami, FL, 33186

Minnreg R.C. Club, 6340 126th Ave. N., Clearwater, FL 34624; David Fox, (813) 787-6032

Monster Hobbies, 231 SE 1st Ave., Boca Raton, FL 33432; Steve Augustus, (561) 392-5447

Morris Kohl's Raceway and Hobby Shop, 1202 W. Waters Ave., Tampa, FL 33604; Morris Kohl, (813) 931-1626

My Rose, 1695 W. Indiantown Rd., Jupiter, FL 33458; Mark Watson, (561) 744-3800

NORRA, 3300 Santa Barbara Blvd., Naples, FL 33999; Jerry Pecar (941) 455-9065 or Mark Benfield, (941) 263-6861

Ocala Radio Control Car Club, 3500 SE 30th Terrace, Ocala, FL 34471; Steve Shook, (352) 694-5147

Paradise Speedway, Mile Marker 98.5 U.S. 1, P.O. Box 738, Key Largo, FL, 33037; Joe Ravard, (305) 451-3707

Paul's Stadium Raceway, 4511 W. Dr. M.L. King Jr. Blvd., Tampa, FL 33614; Paul Surette,(813) 872-8662

PBG R/C Motor Park, 6351 Barbara St., Palm Beach Gardens, FL 33418; Doug Gleason, (561) 743-9791 or Tim Case, (561) 627-2608

Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615

Port St. Lucie Racing, 3626 SW Rivera St., Port St. Lucie, FL 34953; Frank Spadavecchia, (561) 336-8711

River City R/C Car Club, 9711 Sharing Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948

Sarasota RC Speedway, 8475 Cooper Creek Blvd., University Park, FL 34201; Jim Wilson, (941) 358-7047

Sea Coast Watercraft and Hobby, 3119 Barrancas Ave., Pensacola, FL 32507; Vic Lakatos, (850) 457-1493

South Daytona R/C Raceway, 2121 S. Ridgewood Ave., South Daytona, FL 32119; Mike Bean, (904) 426-6481

South Palm Beach Racers, South County Regional Park, West Boca Raton, FL 33486; Mike Fazio,(561) 338-5367

Superior Hobbies R/C Parking Lot Racing, 430 E. Hwy. 436, Ste. #106, Casselberry, FL 32707; Rob Michael, (407) 834-9299

Tallahassee R.C. Raceway, Tom Brown Park, Easterwood Dr., Tallahassee, FL 32311; Roland Costine, (904) 671-2814

Tampa Bay R/C Club, P.O. Box 10224, St. Petersburg, FL 33733; Dick Gillette, (813) 526-0744

Tampa Hobbytown R/C 4 Slot Car Raceway, 15702 N. Dale Mabry, Tampa, FL 33618; Max and Judy Rosenroth, (813) 968-7233

Winterset Raceway, U.S. Rt. 27 South, Winterset Motel, Sebring, FL 33872; John Bisbee or Mac Mixer (941) 699-1140 or (941) 385-4448

GEORGIA

Anthony's Victory Lane, 129 East Hwy 80, Pooler, GA 31322; Anna Stephens, (912) 748-0847

Dalton Raceway, 3036 Parquet Road, Dalton, GA 30720; (706) 226-6699

EEcheconnee Superspeedway, 2149 Richardson Dr., Macon, GA 31206; Andy Thompson or Cliff Kline, (912) 788-8731

EWEEmerald City R.C. Speedway, Highway 40 East, East Dublin, GA, 31021; Terry Cook, (912) 272-3856

The Flight Box Hobby Shop, 3134-C Rockmart Rd., S.E., Rome, GA, 30161-6826; Leslie Duke, (706)-234-3014

Hobby Town Raceway, 2301 Airport Thruway, Columbus, GA 31904; Frank Bastos, (706) 660-1793

HobbyTown Raceway, 225-B Tom Hill, Sr. Blvd., Macon, GA 31210 Marcus Lee, (912) 474-0061

Lake Mayer Raceway, 1430 Dale Dr., Savannah, GA 31406; (912) 598-9709

The Racer's Edge, 1530 Hwy. 19 N., Thomaston, GA 30286; Roger or Mark Walls

Sandy Cross Speedway, Rt. 1, Box 1071, Hwy. 51, Royston, GA 30662; Morris Phillips or Wayne Fowler, (706) 245-9573

SHILOH R/C Raceway, 6362 Shiloh Rd., Hahira, GA 31632; Doug Burnett, (912) 794-2507

Silver Wings Raceway, 5611 Riverdale Rd., College Park, GA 30349; M. Bradshaw, (770) 991-2225

Stinger RC Super Speedway, 3769 Maysville, Rd., Commerce, GA 30529; Deric Sauls, (706) 335-5006 or (706) 335-9044

Sugar Bowl R/C Speedway, 5272 Nelson Brogdon Blvd., Sugar Hill, GA 30518; Shelley Bailey, (770) 945-6709

Valdosta Hobbies, 3998 Inner Perimeter Rd., Valdosta, GA 31602; Ron Hood, (912) 244-2101

HAWAII

A.S.I. Raceway, 4516 Akoa Rd., Kapaa, HI 96746; Arnold Morales, (808) 821-8132

Garden Isle R/C Racers, 5855 Ahakea St., Kapaa Kauai, HI 96746; Arnold Morales, (808) 823-0856

Kakaako Water Front Park Dragway, 98-029 Hekaha St., Bay #32, Aiea, HI 96701; James Inkyo, (808) 487-5155

Keehi Lagoon Park, Leeward Community College, Waipahu, HI 96797; (808) 676-5486

Maui R/C Racing Association, 430 Hookahi St., #13, Wailuku, HI 96793, Tritech R/CHobbies, Radio Control Association, (808) 244-0526

Pearl City Raceway, 98-029 Hekaha St., Bay 32, Aiea, HI 96701; James Inkyo, (808) 487-5155

Radio Control Hawaii, 474 Kalanikoa St., S-104, Hilo, HI 96720; Glenn Shiroma, (808) 935-5629

Team PRC Racing Club, 176 Mamo St., Hilo, HI 96720; Charlie Kawamoto, (808) 935-3561

IDAHO

Capital Dirt Burners, 301 N. Bruce, Boise, ID 83712; Mike Ard, (208) 345-3906

Dirt Stuff Plus, 5344 N. Yellowstone Hyw., Idaho Falls, ID 83401; Brian Krah, (208) 522-7576

ILLINOIS

Adam's R/C Raceway 7201 S. Adams, Bartonville, IL 61607; Ray Tigue, (309) 633-9300

AJ's Raceway & Hobby, 10211 Keslinger Road, Dekalb, IL 60115; A.J. Schultz, (815) 756-2772

C.I.R.C.A., 905 Bibbs St., Jacksonville, IL 62650; Sport 'n' Hobby, (217) 245-1375

C&R Hobbies, 39 E. Jones, Milford, IL 60953; Ray Craighead,(815) 889-4073

Dan's Hobby World, 18415 S. Halsted St., Glenwood, Il 60425; Dan, Bruce or Josh, (708) 754-7988

Gary's R/C Speedway, 1712 East Grove, Rantoul, IL 61866; Gary Dale Flesher, (217) 893-9297

Glenwood Roseway, 18417 Halsted, Glenwood, Il 60425; Don's Hobby World, (708) 754-7988

G&R Raceway & Hobbies, 533 Bank Lane, Highwood, IL 60040; Randy Rose, (847) 432-9600

Hans' RC Race Place, 2051 2100th St., Atlanta, IL 61723; Hans Bishop, (217) 648-2915

HobbyTown Raceway, 9346 Virginia Rd., Lake in the Hills, IL 60102; Mike Hollingsworth, (847) 458-1777

HobbyTown Raceway, 2103 N. Verterans Pkwy., Bloomington, IL 61701; Gary Pritts, (309) 664-4451

Hopkins Hobbies, 723 South 8th St., Century Plaza, West Dundee, IL 60118; (847) 428-9621

Leisure Hours R/C Raceway, 24121 W. Theodore, Bldg. 1, Plainfield, IL 60544; Scott Hill, (815) 439-1777 (track), (815) 439-1477 (shop)

Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-1311

Marly's R/C Hobby, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441

Miley Motor Speedway, 1109 N. Bloomington St., Rte. 23., Streator, IL 61364; Doug, (815) 672-4212

Monee R/C Raceway, 26049 Ridgeland Ave., Monee, IL 60449; Roy or Roberta Moody, (708) 534-2422 (track), (708) 799-5597 (office)

Pontoon Raceway, 3670 St., Rte. 111 Granite City, IL 62040-4304; Pat or Skip, (618) 931-1206

Outlaw R/C Speedway, 1614 Broadway, Mattoon, IL 61938; (217) 234-6229

R/C Workshop, 3100 S.W. Adams St., Peoria, IL 61605; Al Kretz, (309) 673-4860

Radio-Active Raceway, 751 N. Bolingbrook Dr., #15, Bolingbrook, IL 60440; Jim, (630) 759-7557

Rector's R/C Raceway, RR 3, Box 104, Albion, IL 62806; Tim Wolfe, (618) 842-9379 (M-F), (618) 446-3282 (Sun.)

Shiloh Eagles Superspeedway, 308 N. Virginia Ave., Belleville, IL 62220; (618) 277-6030

StRCAR Raceway, 1200 N. Marion, Carbondale, IL 62901; (618) 549-5885

Stanton Hobby Shop, 4718 N. Milwaukee, Chicago, IL 60630; Kevin Kane, (773) 283-6446

Valley Farms R/C Raceway, 706 Bypass 20, Cherry Valley, IL 61016; Dean or Debbie, (815) 332-4516 or (815) 547-5984

Wep Speedway, RR #2, Box 44 Lawrenceville, IL 62439; Bill Poe

INDIANA

Bremen Racing Ent., 308 N. Bowen, Bremen, IN 46506; Dale Heuberger, (219) 546-3807

Dirt Slingger's Raceway, 546 North 12th Ave., Beech Grove, IN 46107; Phil Riley, (317) 787-3815

Elliott's R/C Raceway, 2140 North Plate, Kokomo, IN 46901; (765) 452-0163

GM Raceway, 1651 W. Franklin St., Elkhart, IN 46516; Pete Russell,(219) 293-1827

Hardesty R/C Raceway, 11 East Plymouth St, Hamlet, IN 4653; Max Hardesty, (219) 867-8600

Hobby Barn Raceway, 1950 Springhill, Terre Haute, IN 47802-9694; (812) 299-5773

Hobbytown U.S.A., 5385 E. 82nd St., Indianapolis, IN 46250; Bill Scott (317) 845-4106

Kokomo Hobby & Radio Raceway, 1108 E. Markland, Kokomo, IN 46901; (765) 457-5060

P&T Hobbies and Raceway, RR 2 (Hwy. 60), Mitchell, IN 47446; Paul Weber or Tom Logsdon, (812) 849-6666; email: pnthobby@kiva.net

Race Street Hobbies, 1128 1/2 Race St. New Castle, IN 47362; Jim Burke, (765) 521-4888

RC Barn, 310 N 125 W, Monroe, IN 46772; Mark Lengerich, (219) 692-6600

R.C.R.C. Raceway of Salina, 1300 E. Crawford, Bill Burke Park, Salina, KS 67401; Calvin Calp, (913) 823-9588

R/C World of Indiana, 2246 West U.S. Hwy. 36, Lynn, IN 47355; Joe Kolp, (765) 874-2464; e-mail: rcworld@globalsite.net; web:www.RCWORLD.com

R/C Mania, 8 Wood Ct., Hebron, IN 46341; Ron Trobaugh, (219) 996-6288 (shop); (219) 762-5365

The Rink, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113

Rod's Off-Road R/C Track, 800 N. Division, Bristol, IN 46507; Rod Harms, (219) 848-7848

IOWA

Delb's Speedway, 423 11th Ave. So., Clinton, IA 52732; Rusti's Miniatures and Hobbies, (319) 243-2697

Dubuque R/C Speedway, Dubuque County Fairgrounds, Dubuque, IA 52001; Paul Conlon, (319) 556-2736

Hobby Haven, 7672 Hickman Rd., Des Moines, IA 50322; Rick Marble, (515) 276-8785

Inside Challenge, 2028 Main St., Keokuk, IA 52632; Jessie, (319) 524-2225

Iowa City R/C Racing Association, 1700 First Avenue, Iowa City, IA 52240; Hobby Corner; (319) 338-1788; fax (319) 354-6105

IROAR—Hawkey Downs Raceway, Hawkey Downs, 6th St. S.W., Cedar Rapids, IA 52404; Dave Kleinschrodt, (319) 556-8524

Manly R/C Club, Box 23 (Hwy. 65), Manly, IA 50456; Bruce Hill, (515) 454-2025

Marble's Raceway, 4685 SE 40 St., Des Moines, IA 50317; Rick Marble, (515) 262-7507

Mr. Car Raceway, P.O.Box 1112, Central Iowa Fairgrounds, Marshalltown, IA 50158; Jim Gossett, (515) 483-2234

Outback Speedway, 403 State St., Guthrie Center, IA 50115; Helens Enterprises, (515) 747-3064

Radio Control Raceway Park, 2100 First Ave. N., Fort Dodge, IA 50501; Bernie Halverson, (515) 576-3780

Riverside Raceway, Veteran's Park, Algona, IA 50511; Mike Beisch, (515) 295-9352

Shentona Speedway, 1215 W. Lowell, Shenandoah, IA 51601; Doug Cross, (712) 246-5984

Wild Bill's Raceway, 901 W. Jones, Knoxville, IA 50138; William Anderson, Jr. (515) 842-5973

KANSAS

Hobbytown USA, 2016 W. 23rd, *Lawrence, KS 66046; Kevin* Decemberus, (913) 865-0883

Mike's R/C Hobbies, 121 SE 29th St., Unit #3, Topeka, KS 66605; Mike Barnard, (913) 266-5767

Ottawa Outlaw Raceway, 114 South Main, Ottawa, KS 66067; Tom Wilson, (913) 242-1450

R/C World Raceway, 217 Brownie Ave., Scranton, KS 66537; John and Kyle, (913) 793-2313

RCRC Raceway, 507 N. 4th, Atwood, KS 67730; Bob Dunker, (913) 626-3261

KENTUCKY

Bourbon City Raceway, 213 West Stephen Foster Ave., Bardstown, KY 40004; Ryan Barnes, (502) 349-0069

Johnny's Speedway, 3114 North St., LLoyd Greenup, KY 41144; Charles, (606) 473-0075

Pit Stop Hobbies, 106 A Street, Benton, KY 42025; Robert Fitzgerald, (502) 527-8216

Rick's Hobby Farm, 2089 Park Rd., Hawesville, KY 42348; Rick Early, (502) 927-8527

Trio Hobbies & R/C, 216 Redmar *Plaza, Radcliff, KY 40160;* Maurice Johnson, (502) 351-7547

LOUISIANA

Al's R/C Store, 1529 Anita, Sulphur, LA 70663; Al Gaspard, (318) 625-5880 or (318) 437-8545

Baton Rouge Velodrome, 7122 Perkins Rd., Baton Rouge, LA 70815; Weldon Sharon, (504) 665-5616;

Indy Speedway & Hobby, 3753 General DeGaulle Dr., New Orleans. LA 70131; Vince Sheetz, (504) 367-1891

Pontchartrain Hobby Shop, 3755 Pontchartrain Dr., Slidell, LA 70458; (504) 649-1199

MAINE

Clay Bowl R/C Hobbies, P.O. Box 61, Greene, ME 04236; Pat Cap, (207) 946-5003

R/C Speedway & Hobbies, 87 Main St., Fairfield, ME 04963; David Prescott, (207) 453-4588

MARYLAND

Cockeysville Astrodome Racers, 10854 York Rd. (rear), Cockeysville, MD 21030; Steve Balaz, (410) 666-2521

Countryside Raceway (portable), 406 Pamela Rd., Apt. C, Glen Burnie, MD 21061; M&J's Pormotional Entertainment, (410) 761-6196

Doug's Raceway, 2935 Crain Hwy., Waldorf, MD 20601; Doug Moran, Jr., (301)843-6220

Dusty Downs, 4665 Bethlehem Rd., Preston, MD 21655; Frank Show, (410) 673-2191

Hobby Town USA, 8223-11 Elliot Rd., Easton, MD 21601; Bill Dyke,(410) 820-9308

J.R.'s Race Place, 2935 Crain Hwy., Waldorf, MD 20601; James Radford, (410) 947-2766

Outback R/C Race Club, Maiden Lane., Manchester, MD 21102; Randy or Bonnie Henry, (410) 374-2878

The Track, *16806 Oakmont Ave.,* Gaithersburg, MD 20877; Mimi Wong, (301) 417-9630

MASSACHUSETTS

C&C Hobby & Raceway, 562 Russells Mills Rd., So. Dartmouth, MA 02748; Charlie, (508) 997-4131

Hi-Tech Hobbies, 1681 Broadway (Rt. 138), Raynham, MA 02767; Ruben, (508) 880-5373

Megadrome Raceway, Rt. 8 Curran Hwy. North Adams, MA 01247; Bob Blanchette, (413) 743-7223

Northboro Speedway, 168 Main St., Rte. 20, Northboro, MA 01532; Bob Trimble, (508) 393-8087

MICHIGAN

Down River R/C Racing Club, 1519 Oak St., Wyandotte, MI 48192; Jim, (734) 284-1560, or (734) 287-7405

Freedom Hill R/C Raceway, 35372 Wellston, Sterling Heights, MI, 48312; Curley Grewe, (810) 776-5483

Hobby Hub, 5859 M99, Diamondale, MI, 48821; *Verne Goeble,* (517) 337-9278 or (517) 351-5843

House of Hobbies, 2863 West Shore Dr., Holland, MI 49424; (616) 786-3686

JT Superspeedway, W. Golden Ave., Battle Creek, MI, 49015; Jerry or Sam, (616) 965-0116

Larry's Performance R/C's, *43665* Utica Rd., Sterling Heights, MI 48310; Larry, (810) 997-4840.

MCRC Raceway, 4601 Page Ave., Michigan Center, MI 49203; Sam Sprang, (517) 787-9161

N.M.R.C.C. Raceway, Hobby Toy, Main St., Gaylord, MI 49735; Ed Schneider, (517) 732-3963

Northwest Michigan R/C Club 744 Munson Ave., Traverse City, MI 49686; Jim Ovaitt, (616) 947-6670

Raw Roots Race Tracks, 14623 East Croswell1/4 mile north on 152nd (off U.S. 31), West Olive, MI 49460; Roy Bennink (616) 399-9338

R&L Hobbies & Racing, 9782 Portage Rd., Kalamazoo, MI 49002; Rex Simpson, (616) 323-3686; fax (616) 329-1744

Rodgers R/C Raceway, 7463 Ridge Rd., Britton, MI 49229; George Rodgers, (517) 451-8301

Thumb Raceway, 3441 Main St., Marlette, MI 48453; Jim Wilson, (517) 635-7848

USA Raceways, 6083 Dixie Hwy., Bridgeport, MI 48722; Dave Killingsworth, (517) 777-7USA

Vicksburg Off-Road R/C Raceway, 50201 Silver St., Vicksburg, MI 49097; Tim, (616) 323-7963

Village Hobbies-n-Crafts, 195 N. Elm, Hesperia, MI 49421; Alan or Fran, (616) 854-1374

Village R/C Raceway, Prairie Ronde St., Decateur, MI 49045; Chuck Nolke, (616) 423-7878

West Michigan R/C Racers Club, 814 E. Railroad St., Hastings, MI 49058; Doug, (616) 948-2287 or Pat, (616) 945-3873

Willis Outdoor R/C Racetrack, 13922 Oakville-Waltz Rd., Willis, MI 48191; Mike Higgins, (734) 587-2012

MINNESOTA

Car Town USA, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248

Duey's Hobbies & R/C Raceway, 6600 Cahill Ave., Inver Grove Heights, MN 55076; Duey Carlson, (612) 450-1721

FunCity, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365

Grand Rapids R/C Speedway, 2209 Hwy 2 East, Grand Rapids, MN 55744; Aaron Voges, (218) 326-6751

J's Radio Control Race Park, Rte. 2, Box 266, Starbuck, MN 56381; Jay Campbell (320) 239-4827

Northwoods Hobby Raceway, 2635 Hwy 25 North, Brainerd, MN 56401; *Tom Grogg,* (218) 829-9257

Paul Bunyan Raceway, Rte. 1, Box 468, Bemidji, MN 56664; Brad Trask, (218) 243-2749

Ray's Raceway Park, 105 3rd Ave. NE, Glenwood, MN 56334; Dan Winter, (320) 634-5246

R/C Racing World, 235 Main Ave. North, *Harmony, MN 55939;* Mark McKay, (507) 886-5931 or (507) 886-2224

Southside Speedway, 2241 Marion Rd. SE, Rochester, MN 55904; Kevin Guy, (507) 281-3233

Time R/C Raceway, 20 West Lake St., Chisholm, MN 55719; RV, (218) 254-4321

Trackside Racing, 443 8th Ave. NW, New Brighton, MN 55112; Winton Oftelie, (612) 633-2112

MISSISSIPPI

Joe McFaden Hobbies, 5531 Fox Meadow Dr., Meridian, MS 39307; Joe McFaden, (601) 483-7000

Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST

MISSOURI

All Seasons Hobby, *152 O'Fallon* Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767

B&L Hobbies & Raceway, 2800 Anchor Dr., Park Hills, MO 63061; *Bob Marler, (573)* 431-9444

Fire Mountain Raceway, 8647 Commercial Blvd., Pevely, MO 63070; Dan Gordon, (314) 475-6449

Greentree R/C Racepark, St. Louis Dirt Burners R/C Club, Marshall Rd., Kirkwood, MO; (314) 831-2194

Ozark Mountain Speedway, Rt. #2 Box *50, H-Highway and County Rd. 31,* Noel, MO 64854; Clayton Younker (417) 475-6222

Ozarks R/C Raceway, Hwy 13N, Brighton, MO 65781; Gene Rhodes or Ron Hawkins, (417) 742-4376 or (417) 742-7223

North Missouri Raceway, 223 Graves St., Chillicothe, MO; Billy Johnston, (816) 646-1120

Real Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238

Real R/C Raceway, *24204 State Rt. 58,* Pleasant Hill, MO 64080; Steve Hale, (816) 540-5584

MONTANA

Stormer Raceway & Slot Motorplex, P.O. Box 126 Hwy. 2 East, Glasgow, MT 59230; (406) 228-4569

NEBRASKA

Goodyear Speedway and Off-Road, 4021 North 56th, Lincoln, NE 68510; Tom or Bob, (402) 464-5172

Hadar R/C Raceway, *55192 849th Rd., Norfolk, NE 68701;* John Schoenauer, (402) 644-7922

Hobby Town USA Raceway, N 1st St. & Cornhusker Hwy., Lincoln, NE 68508; Mark Kovarik, (402) 434-5056

Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865

O.N.R.O.A.D., 3307 N. 58 St., Omaha, *NE 68104; Cook Jacobs,* (402) 556-8674

OTWG Carpet Raceway, 55129 849th Rd., Norfolk, NE 68701; John Schoenauer, (402) 644-7922

RC Motorsport Off-Road Raceway, 5600 Mass Rd., Papillion (Omaha), NE 68133; Marty Stepanek, (402) 593-6133

Salvation Army South Corps, 4032 *Harrison St., Omaha, NE 68164;* (402) 734-3414; fax (402) 734-3415

Siouxland R/C Car Association, 206 E. 13th St., South Sioux City, NE 68776; Jeff, (402) 494-1525

NEVADA

Dansey's Indoor R/C & Hobbies, 741 N. Nellis, Las Vegas, NV; David Lugo, (702) 453-RACE

Lizard Raceway, P.O. Box 1248, Verdi, NV 89439; Jeff Griffin, (702) 345-6573

NEW HAMPSHIRE

Axis Racing R/C Dragway, 4197 High St., Exeter, NH, 03833; Dan Peterson, (603) 659-4877

Economy R/C Speedway, *4 Maple St.,* Winchester, NH 03470; Harold Thomas, (603) 239-4482 or 239-6470

Robert's Railroad & Hobbies, 1335 1st NH Turnpike—Rt.4, Northwood, NH *03261; Robert M. Jeffers, Jr.,* (603) 942-5193

RT 106 Racepark, 743 Clough Mill Rd., Pembroke, NH 03275; Douglas Graves, (603) 224-RACE

NEW JERSEY

America's Hobby Center Inc., 18300 Tonnelle Ave., North Bergen, NJ 07047; *John Many,* (201) 662-0777

Ray's American Raceway, 142 Wilson Ave., Englishtown, NJ 07726; Ray Whitehead, (908) 446-3737

Family Hobbies Raceway, 3576 N.W. Blvd. & Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790

Jackson R/C Racing, P.O. Box 565, Christopher Columbus Blvd., Jackson, NJ 08527; Al Sodano, (732) 364-6422

Jefferson Speedway, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525

Jerry's Hobby Center & Raceway, 336 Rt. 22W, Greenbrook, NJ 08812; Jerry or Gary, (908) 752-6030

LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122

Millville R/C Oval, 114 N. High St., Millville, NJ 08332 William Denstoz, (609) 327-4640

Pit Stop Dragway, 100 Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-7223

On Trax Hobbies, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422

R/C Shag Arena, 690 Jendi Pkwy., Totowa, NJ 07513; Amber Beggell, (201) 956-7223

South Jersey Cost Controlled Racing, 25 Jackson Lane, Sicklerville, NJ 08081; Ray Murray, (609) 629-4809

The Race Place, 1151 Hwy. 33, Farmingdale, NJ 07731; John Fary, (908) 938-5215

NEW MEXICO

Charlie's Hobby Shop, 225 E. Idaho, Suite 11, Las Cruces, NM 88005; Kim or Chuck, (505) 541-1097

Meerscheidt R/C Raceway Park, Meerscheidt Recreation Center, Walnut and Hadley by BMX, Las Cruces, NM 88005; Robert Heinsen (505) 526-6856 or Jim Meerscheidt (505) 523-2995; email: MEERSCH@aol.com

NEW YORK

BarnStormers, MD #1 Old Oxford Rd., Chester, NY 10918; Lou (914) 469-8206

Brownie's Pro & Sport Hobbies, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194

Bruckner Racing, 2908 Bruckner Blvd., Bronx, NY 10465 Thomas Baffers Sr.,(800)-288-8185

BSK Hobbies & Raceway, 120 Main St., Hornel, NY 14843; Bruce Harris, (607) 324-4011, (800) 603-0197.

C&C Speedway, 570 Conklin Road, Binghamton, NY 13903; Eric Boyd, (607) 773-2044

C&D Raceway, 12542 NYS Rte. 12E, Chaumont, NY 13622; Chris or Don *Bourquin,* (315) 649-5403

Capital District R/C Racers, 27 Venus Dr., Albany, NY 12205; Keith Green, (518) 783-8036

Chipmunk Hill R/C Speedway, 217 Pine St., Theresa, NY 13691; Ted or Pete House, (315) 628-5065

East Coast R/C Hobbies, P.S. 186 *School yard, 7601 76th St.,* Brooklyn, NY 11204, for mail, 2515-65th St., Brooklyn, NY 11204; Brian Cardella, (718) 627-3814

Foothills R/C Speedway, 3200 *Chestnut St., Oneonta, NY 13820;* Dave Osterhoot, (607) 432-5098

Frogtown Hobbies, Rt. 37, Mini Pines Village, Hogansburg, NY 13655; Dennis White, (518) 358-3686

Hacr's Hobbies & Raceways, 120 Cayuga St.,Canal View Mall, Fulton, NY 13069; Jack LaTulip, (315) 598-7063

Jerry's Raceway,
111 S. Applegate Rd., Ithaca, NY 14850;
Jerry and Lori Achilles, (607) 277-0940

LI ¼-Scale Racers, 63 Horton Dr.,
Huntington Station, NY 11746;
(516) 351-5384

Long Island Raceway, 168 Broad
Hollow, Farmingdale, NY 11735;
James, (516) 845-7223

Performance Plus Radio Control Speedway/ The Hobby House, 1141 ½
Jones & Gifford Ave., Jamestown, NY
14701; (716) 488-1772

P.R.O. Speedway, 5 Washington St.,
Cattaragus, NY 14719;
Marc Pritchard, (716) 257-3101

Radio Hill Raceway, 1219 Shannon
Corners Rd., Dundee, NY 14837;
Bill Brewer, (607) 243-8641

Rampage R/C, 27 Fuller Lane, Hyde
Park, NY 12538; Brian Walker,
(914) 229-1379; (914) 229-2456

R/C Competition Corner, 2413
Brewerton Rd., Mattydale, NY 13211;
Lori and Cos Ciririello, (315) 455-8718

R/C Sport Hobby, 69-57 Juniper Blvd.
South, Middle Village, NY 11379

Schoharie Co. R/C Car Club,
P.O. Box 126, Cobleskill, NY 12043;
(518) 922-6982

Southern Tier Raceway, 88 Paige St.,
Owego, NY 13827
Anita Harding, (607) 687-5395

South Shore Hobby & Raceway
464 East Main St.,
Patchogue, NY 11772;
Benny or Bonnie, (516) 758-5567

Tri County Remote Control Car Club,
33 West Decker St., Johnstown, NY 12095;
Jim Sprouse, (518) 762-8884

Tri-state Area Radio Control Model Auto Club (TARMAC), 28/30 Mountain
View Rd., Poughkeepsie, NY 12603; Todd
(914) 342-5409;
tracksite (914) 454-8276

Walt's Hobby, 2 Dwight Park Dr.,
Syracuse, NY 13209; (315) 453-2291

Westfield R.C. Speedway,
27 Clark St., Westfield, NY 14787;
John or Jared Lindstrom,
(716) 326-2339; 716-326-2309

Whitestone, 30-56 Whitestone Expy.
(Dept. of Motor Vehicles), Flushing, NY
11374; Rudolf Ardilla, (718) 966-6155

ZOAR Road Speeedway, 15318 Armes
Ct., Gowanda, NY 14070; David &
Gordon Ackler, (716) 532-9463

NORTH CAROLINA

A&J R/C Models, 2051 Anthony Rd.,
Burlington, NC 27215; Jerry Loye or
Andrea Thompson, (910) 227-4556;
fax (910) 227-1001

Another Zito's Mobile MASCARR Inc.,
412 E. Blume St., Landis, NC 28088;
Carmen Esposito or Pat Youngerman,
(704) 451-3293

The Antique Barn, 2810 Forest Hills Rd.,
Wilson, NC 27893; (919) 237-6778

Atlantic Coast R.C., 8-A Lockhead Ct.,
Greensboro, NC 27409; Charlie Higgins
or Harry Johnson (910) 664-1277

Badin Shore Raceway, 1730 Jackson
Lake Rd., High Point, NC 27263; Jimmy
or Tim Martin, fax (910) 431-6407

C/C Hobby Speedway, 8358 U.S. Hwy.
220 Bus. N., Randleman, NC 27317;
Steve & Mary Cox, (910) 495-3482

C&H Raceway, 1400 N. Cannon Blvd.,
Kannapolis, NC 28083; Camera & Hobby
Shop, (704) 933-5321

C/W R/C Speedway, 1297 Charlotte
Hwy., Asheville, NC 28730; Billy or Tim,
(828) 684-0061

Carolina Dragway, 907-D Warsaw Rd.,
Clinton, NC 28328; (910) 592-4569

Chatham R/C Raceway, 326 Reno
Sharpe Store Rd., Bear Creek, NC 27207;
Dwight Fields, (919) 898-2991

Green Flag RC Raceway,
107 Harley Rd., Wilmington, NC 28401;
Mike McLemore, (910) 397-0676 or
(910) 452-1620

R & D Speedway,
418 Main St., Tarboro, NC 27886;
John Dupree, (919) 823-2294

Ride& Slide R/C Raceway, 5319 Yadkin
Rd., Fayetteville, NC 28303; Bill
Culbertson, (910) 867-4202

R&J Off-Road Racing, 6172 Blalock
Rd., Lucama, NC 27851; Robert
Williams, (919) 239-0853

Radio Jockey's Parkway, "RJ's,"
Rt. 9, Box 651, Fay, NC 28301;
Tony Starling, (910) 486-4820

Rosewood R/C Speedway, 651
Community Dr., Goldsboro, NC 27530;
Glenn Elam, (919) 731-4734

Southern RC Motorsports Club, Hwy.
17S., P.O. Box 1651, Shallotte, NC
28459,; Mark Whitt, (910) 754-4902 or
Eddie Ferster, (910) 754-8528

Ultratrax,5505 Palmers Branch, Leland,
NC 28451;
Mike Williams, (910) 313-0350

NORTH DAKOTA

Hacienda Hills Speedway,
20 Hacienda Hills, Minot, ND 58701;
Kenny Duchscherer, (701) 839-4419

Northern Mini Racers,
1000 36th St. SE, Minot, ND 58702;
Mike, (701) 838-5818

River City R/C, 2714 Main Ave.;
Fargo, ND 58103;
Chris Hughes, (701) 235-1272

OHIO

American Ohio Sprint Car,
1708 Empire Rd., Wickliffe, OH 44092
Gary Waldhelm, (440) 944-9966

CORCAR/ Sams Club, 128 Amity Rd.,
Galloway, OH 43119-8732;
Bill Stevenson, (614) 870-7159

Columbus R/C Racing Club (C.R.C.R.C), Franklin County
Fairgrounds, Hilliard, OH 43026;
Jeff Crowell, (614) 236-1783

D&D Hobby Center, 1344 Lexington
Ave., Mansfield, OH 44907;
Eric Radio (419) 756-9771

D&J R/C Raceway, 801 W. Market St.,
Orrville, OH 44667; Don Yoder or Mark
Nussbaum, (330) 682-4266

Dirt Trax, 2206 13th St. NE, Canton, OH
44705; Dan Mauger, (330) 833-3091

Full Throttle Raceway, 600 Mt. Moriah
Dr., Cincinnati, OH 45255;
Greg Roshan, (513) 943-9009

Fun for All Raceway,
675 College Dr., Batavia, OH 45103;
Steve Donaldson, (513) 732-0440

Glass City Radio Control,
2620 Ivy Pl., Toledo, OH 43613;
Frank Johnson, (419) 472-1286

Greentown R/C Raceway, 3353
Perrydale, Greentown, OH 44630;
Chuck Lambert, (330) 364-6585

Hobby Shop Raceway, 2096 Miamiburg,
Centerville Rd., Centerville, OH 45459;
The Hobby Shop, (937) 436-6161

Hobby World, 3499 SR 59,
Ravenna, OH 44266;
Tom Fry, fax (330) 296-0894

Lafferty R/C Raceway, Box 153, 70228
Hurrah St., Lafferty, OH 43951;
Chris Christman, (614) 968-4818

Lakes Hobbies, 3425 Manchester Rd.,
Akron, OH 44314
Roy Spencer, (330) 645-6912

Medina R/C Raceway, 754 N. Court St.,
Medina, OH 44256;
Bill Aholt, (216) 723-0255

Mid American Raceway, 13150 Airport
Hwy., Swanton, OH 43558
Bill or Chuck, (419) 475-9459

Nothing But Air R.C. Track, 34632 True
Rd;, Logan, OH 43138
Gary Lloyd, (740) 385-0288

Scooters Hobby Hut, 234 Robbins Ave.
#D, Niles, OH 44446; Dave "Scooter"
Evans, (216) 544-9411

Shiray's Hobby & RC Raceway, 19930
State Route 117, Waynesfield, OH
45896; Ray Zimmerman,
(419) 568-8055

TARCAR, 7216 Nebraska Ave., Toledo,
OH 43617; Bill Bridges, (419) 826-3859

Tri-State R/C Auto Racers,
Joyce Park, Hamilton, OH, 45011;
Ernie Bauhoffer, (513) 528-2052

Van Wert R/C Raceway, 144 E. Main St.
(above Hoverman Music), Van Wert, OH
45891; Mark Davis, (419) 232-2112

Y-City Hobby & Speedway,
120 S. 6th St., Zanesville, OH 43701;
Kevin McKenna, (614) 455-3025

OKLAHOMA

Adams Creek R/C Speedway, 5207 S.
194th E. Ave., Broken Arrow, OK 74014;
John Beighle, (918) 355-1416

Competition R/C, 100 SE 89th,
Oklahoma City, OK 73149; James or
Louise Brown, (405) 634-0809

Coweta Hobby & Speedway, 310 S.
Broadway, Coweta, OK 74429;
Derialdd Seabolt, (918) 486-3948

R/C Speedway,
1401 N. Vanburan, Enid, OK 73701;
Sean or Jessica Hillery; (405) 237-5504

Remote Control Race Course, 2600
SI-35 Serv. Rd, Moore, OK 73124;
Rick or Steve, (405) 993-RACE

Wild Country Speedway, 127 South
Main, Porter, OK 74454; Charles
McCollough, (918) 685-0372 or
(918) 687-1686

OREGON

Competition Racing Association,
17941 NE Gleason, Portland, OR 97230;
Mark Taylor, (503) 761-1334

D.I.R.T. (Diamond International Race Track), 65540 73rd St., Bend, OR 97701;
Daleyne and Edward Glietz, (541) 388-
2932 or 1-800-475-6040, ext. 777

Junior Vehicle Speedways, 3634 Table
Rock Rd, Medford, OR 97501;
(541) 664-7810

Pit Stop Hobby, 634 N. Coast Hwy.,
Newport, OR 97365;
Richard Wood, (541) 265-2825

R/C Craze Speedway,
300 Ashland Lane, Ashland, OR 97520;
Shawn Lazareff, (541) 482-4786

R/C Plus Hobbies Raceway,
185725th St. SE, Salem, OR 97302;
Ron Smith, (503) 364-9188

R/C Speed Center, 2810 N. Pacific Hwy.,
Medford, OR 97501; Gene and Betty Jean
Skelton, (541) 779-8298

Yamhill County R/C Car Club,
722 Morgan Ln., McMinnville, OR
97128; Larry Rucker, (503) 472-7234

PENNSYLVANIA

Bachman's Speedway & Hobbies,
Box 306, Effort, PA 18330-0306;
Jeffrey Bachman, (610) 681-5845

Brookville Hobby Shop,
170 Main St., Brookville, PA 15825;
Mark Tonell, (814) 849-7385

Columbia Racing Association,
128 N. Front St., Philipsburg, PA 16866;
Lurch Hammal, (814) 342-7114

Cooks Way Raceway, Cook's Way, Mt.
Pleasant, PA 16666;
Bob Rhodes, (412) 547-5719

Courtview Raceway, 20 S. Main Street
(lower level), Washington, PA 15301;
Aaron Stimmell Jr., (724) 225-4302

DC Ultra Trax, 13 York Rd.,
Wycombe, PA 18974;
David Cowan, (215) 672-5200

Dreamboat Hobbies,
2810 Pennsylvania Ave. W., Warren, PA
16365; Louie Dussia, (814) 723-8052

Fantasy RC's and Hobby,
2315 W. 12th St., Erie, PA 16505;
Frank Francis, (814) 453-6337

Hipkin's Hobbies, 402 W. Avondale Rd.,
West Grove, PA 19390;
Doug, (610) 869-8585

Hobby America Raceway,
5 Fitzsimmons St., Duke Center,
PA 16729; Dan or Mike Coast,
(814) 966-3765

Koontz's Home & Hobby Center, 1205
Hoover St., Pittsburgh, PA 15204;
(412) 331-3866

Kranzel's R/C Raceway & Hobbies,
415-B Bosler Ave., Lemoyne, PA
17043; David or Stuart Kranzel,
(717) 737-7223

Little Plum R/C Hobbies, RR 1 Box
330, Lock Haven, PA 17745;
Larry Duck, (717) 769-1984

Lugnut Raceway, 1713 Bethlehem
Pike, Hatfield, PA 19440; Bill Henning
or Kathy Anderson,
(215) 822-5831

Marshall's R/C Raceway, RR 4, Box
640, Honesdale, PA 18431; Bill or Dot
Marshall, (717) 729-7458

The Mushroom Bowl, 960 W. Cypress
St., Kennett Square, PA 19348;
Bruce or Drew, (610) 444-1850

Pinion Twisters, 3M Plant, Green Ln.
and Mitchell, Bristol, PA, 19007; Mark,
(215) 632-2344 or Tony, (215) 742-3560

Pit Stop Hobbies, 262 W. Main St.,
Mount Joy, PA 17552;
James Stoudt Jr., (717) 653-6222

Prop & Wheels Raceway,
139 W. Broad St., Tamaqua, PA 18252;
Gil Walters, Prop & Wheels Hobbies,
(717) 668-2288

The Raceway at River Junction, 1216
4th St. (behind cemetery), Beaver, PA
15009; (412) 728-5571

RC Ave. Raceway 324 McKinley
Ave, Latrobe, PA 15650
Scott Smith, (412) 537-5501

RC Outfitters RCO Raceway
519 Broadway, Hanover, PA 17331;
Chris Shaffer, (717) 633-9490

R/C Pro Speedway, Millville Rd.,
Bloomsburg, PA 17815; John
Swisher, (717) 387-0266;
fax (717) 387-4937

R/C Pro III, 910 Chestnut St., Coal
Twp. (Shamokin), Shamokin, PA
17866; John Swisher,
(717) 648-7763

Riverside Raceway, PA Ave. W &
Hickory, Warren, PA 16365;
Jeff, (814) 723-4211

S.A. Hi Banks, Hahn's Dairy Rd,
Palmerton, PA 18071;
Scott Andrews, (610) 826-4583

Sinking Spring Race Center,
237 South Hull St., Sinking Spring,
PA 19608;
Randy Gelsinger, (610) 670-0760

Staub Bros. R/C Speedway,
31 Locust St., Gettysburg, PA
17325; Todd or Scott Staub,
(717) 334-5445

TnT Raceway, Randolph Rd.,
Great Bend, PA 18821; Frenchie,
(607) 775-1750 or Ed Kraft,
(717) 967-2604

Trains & Lanes Raceway, 3825
Northwood Ave., Easton, PA 18045;
Jeff Setzer, (610) 253-8850,
(800) 447-4891

Willow Mill Speedway, 37 N.
Season's Dr., Dillsburg, PA 17019;
George Verbowitz, (717) 432-4445

Willow Run R/C Raceway, 135
Wright St., Corry, PA 16407;
Jim Small, (814) 664-8147

World A.T.L.A.S./P.A.R.C.E. R/C Raceway Hobby Shop & R/C Club,
Chester Exchange Mall,
10th & Morten St.,
Chester, PA 19013; Darryl, Lee or
Marc, (610) 874-2540

PUERTO RICO

Cidra R/C Track, Carr 7787 KM 1.6,
Bo Beatriz Adentro, Cidra, Puerto
Rico 00739; Humberto (Tito)
Lizardi, (787) 739-1572

Dorado Offroad R/C Track,
Pista Atletica Bo. Higuillar, Dorado,
Puerto Rico 00646; Roberto
Lamoso/Jaime Ramos,
(809) 796-5603 or (809) 796-1734

Hacienda Muñoz R/C Track, Carr.
#14, Juana Diaz, PR 00795;
(809) 837-7083

RHODE ISLAND

SK Hobbies Inc., 15 Carl St.,
Johnston, RI 02919; Slim or Keith,
(401) 453-1440

Tri-State R/C Raceway, 205
Hallene Rd., Warwick, RI 02886;
Raymond Dean, (401) 738-4908

SOUTH CAROLINA

Carolina R/C Speedway, 4148
Calhoun Memorial Hwy., Easley, SC
29640;
Craig Prahl, (864) 295-1209;
www.carolinarc.com

Extreme R/C Raceway,
5976 Grace Lane,
Myrtle Beach, SC 29577;
Kevin Bullock, (803) 236-2083

The Grove Racing Center, 939 S. Anderson Rd., Rockhill, SC 29730; Mike Durham or Don Faris, (803) 327-4121

Hobbies and More, 1570 S. Main St., Darlington, SC 29532; Jerry Pollard, (803) 393-0355

J&M R/C Hobbies, 5341 Dorchester Rd., Evanston Plaza, N. Charleston, SC 29418; Mike Smith, (803) 552-9449

Midway Hobby and Raceway, 707 Sulphur Springs Rd., Greenville, SC 29611; Allen A. Dodson, (864) 246-6335

ORA Atomic Racing Facility, 373 Boyd Pond Rd, Aiken, SC 29803; Bill Jackson, (706) 855-0846 or (803) 642-0314

SOUTH DAKOTA

Action R/C Raceway, 107 N. Main, Mitchell, SD 57301; (605) 996-6895

Boomerans Raceway, 105 N. Main, Hartford, SD 57033; Ed Smithback, (605) 528-7345

Dakota Off-Road Racers, 2989 W. Br. Co. 12, Aberdeen, SD 57401; (605) 226-0604

Goldtrax Raceway, 409 E. High, Lead, SD 57754; Steve Brown,(605) 584-2355

K&B Speedway, 27283 SD Hwy. #115, Harrisburg, SD 57032; Mike Kosetin, (605) 743-2582

R/C Action Raceway, SE Corner at 484th & Hwy. 38, Sioux Falls, SD 57105; Brian Cox, (605) 373-0511

TENNESSEE

D&M's Downtown Raceway, 2703 U.S. Hwy. 411S, Maryville, TN 37303; (423) 681-8919

Hillside R/C Raceway, 4194 Oakhill Rd., Dayton, TN 37321; John and Rusty Tipton, (423) 775-4739

Hobby Town USA, 2000 Mallory Lane, Franklin, TN 37067; Bobby Mills, (615) 771-7441

Lawson Raceway, 152 Joel Rd., Oliver Springs, TN 37840; Anthony Lawson, (206) 815-0379

Machine-Head Straits, 938 Grandmere Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 762-6630

MSA R/C Racing, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley, (615) 456-0027

Sparta Raceway Park, 32 N. Main St., Sparta, TN 38583; Carl (Buddy) Elrod, Rt. 5 Box #652, Sparta, TN 38583; (615) 836-8450 or (615) 761-3407

TnT Raceway, 643 Loop Hollow Rd., New Tazewell, TN 37825; Cliff Swett, (423) 626-9065 or (423) 869-8942

W.O.W. Raceway, 59 Luray Rd., Beech Bluff, TN 38313; Kelly Bean, (901) 427-7874; email: windix60@pipeline.com

TEXAS

215 Speedway, 1814 County Road 215, Abilene, TX 79602; Clyde Gardner, (915) 673-2351

Big Mike's R/C Raceway, 1405 W. Cotton St. (behind the Locker Room), Longview, TX 75604; (903) 297-7814

Comanche Trail RC Park, City Park, Big Spring, TX 79720; Allen Nichols, (915) 263-4241

Discount Hobbies, 1722A West Anderson Loop, Austin, TX 78757; Tony Bermudez, (512) 458-2324

Drycreek Raceway, 5903 Co. Road 2297, Quinlan, TX 75474; Micky Alphin, (903) 883-4060

Eastex Raceway, 45000 Hwy. 59 N., New Caney, TX 77357; Brent Mahaffy, (713) 399-9777

Fastrack Raceway, 301 Edith Drive, El Paso, TX 79924; Hector Gonzalez, fax (915) 779-4524

Flip & Spin R/C, 5957 Jones Rd., Bryan, TX 77807; Garland Crabb, (409) 822-7311

Hal's Hobby Raceway, 1440 Bessember, El Paso, TX 79936; (915) 591-2213

The Hobby Center Raceway, 4104 Stan Schlueter Loop, Ste. 1, Killeen, TX 76543; Lawrence Remick, (817) 690-7311

Hobbycraft Speedway, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (903) 872-6761

Hobbytown USA, 7676 FM 1960 W., Houston, TX 77070; Fred Pfafman, (713) 955-7097

Hobbytown USA, 999 E. Basse Rd., Suite 177, San Antonio, TX 78209; Joe Sena or Clark Baisdon, (210) 829-8697; fax (210) 829-8707

Indy R/C World, 220 Saturn Rd., Garland, TX 75041; Steve Webster, (214) 271-4844; fax (214) 271-4502

Issac's Race Track, 18177 Gulf Frwy., Houston, TX 77598; Issac Ben-Ezra, (281) 488-8697

Keyser's Hobbies, 1643 Texas, College Station, TX 77840; Bill Bennett, (409) 693-8095

MBRC Off-Road Raceway, 204 D&E Valley Lane, Kennedale, TX 76133; (817) 292-5055

North Houston Speedway, 11847 Spears Rd., Houston, TX 77067; Bob or Carol Hillin, (713) 872-2471

North Texas 1/12 Scale Association, 3905 Sandia, Plano, TX 75023; Dean Densmore, (972) 519-0324

Performance Raceway, 1106C Witte Rd., Houston, TX 77055; Jorge Tabush or Terry Schmid, (713) 464-4458

Rev It Up Raceway, 3076 Kellar Rd., Smithville, TX 78957; Rev, Alton T. Edwards, (512) 360-5443

Rick's R/C Raceway, 23B Scenic Loop, Boerne, TX 78000; Rick, (210) 981-2245 or Rich, (210) 590-1805

Rough Country, 905 Jacksboro Hwy., Wichita Falls, TX 76301-5310; Robert Kerr, (817) 322-2453

Star/Car Raceway, 5802 Patton St., Corpus Christi, TX 78415; Glen Stead, (512) 949-8525; Race Hotline, (512) 881-6105

T&T Eagle, 161 W. Spring Creek Pkwy., #601, Plano, TX 75023; Tony Welborn, (214) 517-0562

Terminal Velocity R/C Raceway & Supply, 200 Wallington, Ste. 223, El Paso, TX 79902; Rick or Frank, (915) 534-9198

Texas Speedway, 6707 Chimney Rock, Bellaire, TX 77401

Tiger's Den R/C Speedway, 702 E. Broad St., Mansfield (DFW), TX 76063; Bob Burns, (817) 477-5513

T.Q. Offroad Raceway, 6236 Quail, El Paso, TX 79924; Efren Saenz, (915) 821-7522

Triple Jays R/C Raceway, Rte. 4, Box 720, Allen, TX 75002; Jeffrey Jay Johnson, (972) 562-7967

Warehouse Radio Controlled Raceway, 612 W 4th St., Amarillo, TX 79101; Craig or Darren Waddell, (806) 374-6485

W.E.S. Hobby Race, 980 S. Fourth St., Beaumont, TX 77701; Edmond Richards, (409) 839-4929

Wild Bill's Raceway, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Tom Nix, (214) 438-9224

UTAH

Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044; David Mott, (801) 250-8303

Payson R/C Raceway, 955 South Main, Payson,UT 84651; Gus Wood, (801) 224-3852 and Lasca Wood (801) 222-8677

Vision Hobby, 352 N. State St., Orem, UT 84057; Ken Rice, (801) 226-6226

WOR Raceway, 3170 Brinker Ave., Ogden, UT 84401; Brian Worton, (801) 393-2530

VERMONT

Barre Town R/C Club, 14 South Main St., Wall St. Complex, Barre, VT 05641; Russ Tribble or Pete Perreault, (802) 888-2860 or (802) 476-9458

Bradford R/C Racing, Main St., Bradford, VT 05033; Seth Bean, (802) 222-9674

Stoughton Pond Raceway, Stoughton Pond Rd., Perkinsville, VT 05151; Rick Adams, (802) 263-9321

VIRGINIA

Bob's Hobbies & Raceway, 7422 Brandycreek Dr., Mechanicsville, VA 23111; Bob, (804) 746-2758

Brown Brothers Hobbies, 924 North Main Street, Dumfries, VA 22026; Joel or Bob Brown, (703) 221-5746

Cooper's R/C Race Center, 4000 Sago Rd. (969), Chatham, VA 24531;Norris Cooper, (804) 724-7342 or(804) 724-4182

DRCW Raceway, Debbie's RC World, 2200 Commerce Parkway, Virginia Beach, VA 23454; Les Modlin, (757) 340-6681

Gloucester Scale Hobbies, 2352 George Washington Memorial Highway, Hayes Plaza,Hayes, VA 23072; Rob Thein, (804) 642-3484

Hobby Hangers Speedway, 14014 D Sullyfield Cir., Chantilly, VA 20151; Kwang or Billy, (703) 631-8820

The Hobby House, 116 Edds Ln., Sterling, VA 20165; Oppie, (703) 444-0333

KC's Radio Control & Repair, Rt. 4, Box 312, Trents Ferry Rd., Lynchburg, VA 24503; Curtis or Kim Wright, (804) 384-8596

Olde Towne Hobby Shoppe, 9105 Center St., Manassas, VA 22110; Arnie Levine, (703) 369-1197

Race World Hobbies, 6102 Lakeside Ave., Richmond, VA 23228; Larry Boyd, (804) 553-8040

Roadmasters/ Rick's Hobbies, 12201 Balls Ford Ave., Manassas, VA 22110; Rick, (703) 330-6833

Shamroc Raceway, 106 Cheviot Place, Stephens City, VA 22655; Scott Janow, (540) 869-3551; Note: track is located in Winchester , VA

Thunder Road RC Racing, P.O. Box 1022, Troy, VA 22974-1022; James Palmer, (804) 589-8174

The Toteyard, Route 1, Box 235A, Dayton, VA 22821; (540) 828-3476

Trackside Hobbies, 1920 E. Pembroke Ave., Hampton, VA 23663; Rick Cardwell, (757) 723-4170

Trainland R/C Racing, 5661 Shoulders Hill Rd., Suffolk, VA 23435; Frank Stevens, (757) 488-5454

WASHINGTON

Alfie's, 108 South K St., Aberdeen, WA 98520; (360) 533-6638

A-Main Raceway, 14011 NE 3rd Ct., Vancouver, WA 98685; Monty Coleman, (360) 571-8404

Burien Toyota R/C, 15025 1st Ave. South, Seattle, WA 98148 Ray Meek, (800) 654-6456

C&C Raceway, 266 Lind Ave. NW, Revton, WA 98055; Charles Lakin, (206) 227-5167

Cedardale Raceway, 1673 Cedardale Road, Mount Vernon, WA 98273; Joe Madonia, (360) 659-0072; e-mail: getchell@halcyon.com

Four Season R/C Racing, 2941 Sleater Kinney Rd. NE, Olympia, WA 98506; Gary and Sharon Brown, (360) 491-2430

Hale's R/C Raceway Park, 10611 136th St. E. Puyallup, WA 98374; Walt Hale, (206) 845-7675

Hannegan Speedway, 4212 Hannegan Rd., Bellingham, WA 98225; Dana Hoggarth, (360) 734-4090

Raceway Hobbies, 188 Sunset Ave. S., Edmonds, WA 98020; Brian Bodine, (425) 774-3285

Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Failla, (206) 653-8838

Spokane Indoor Raceway, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Mapston, (509) 534-RACE

Tacoma R/C Raceway, 6305 6th Ave., Tacoma, WA 98406; Scott Brown, (206) 565-1935

Tearor Raceway, Fantasy World Toy and Hobby, 7901 S. Hosmer, Tacoma, WA 98408; Dave Kleinman,(206) 473-6223

Ultimate R/C Raceway, 907 Cole St. #3, Enumclaw, WA 98022; Dan Daugherty, (360) 802-2388

West Coast Hobby & Raceway, 2239 Stevens Drive, Richland, WA 99352; Darren Shank, (509) 375-4995

Zep's Hobbies & Raceway, 530 Interlake, Moses Lake, WA 98837; Steve Ralph, (509) 765-8191

WEST VIRGINIA

Burr-Fab Raceway, 90 Davis St., West Union, WV, 26456; Mark Travis, (304) 873-2487

Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26003; James Fulton, (304) 233-5355

Left Turn Hobbies, 100 Saco Ln. (by Post Office), Glen White, WV 25849; Stretch, (304) 255-3930

Race Zone, Hopewell Rd., Rt. 8, Box 343A, Fairmont, WV 26554; Joe Clutter (304) 368-1000

WVRCA R/C Club, 142 West Main, Bridgeport, WV 26330; D.W. Weed

WISCONSIN

ABC R/C Inc & Raceway, 244 W. Main St., Waukesha, WI 53186; Dick Mathiesen, (414) 542-1245

Gary's Hobby Center, 3701 Durand Ave., Racine, WI 53403 Bill Phalen, (414) 554-8884

Heart of the Valley R/C Club, 1330 Midway Rd., Menasha, WI 54952; Bill Morgan, (920) 954-1695

Hobbytown USA, 2061 South Koeller, Oshkosh, WI 54901; (414) 426-1840

Hobbytown USA - Revolution, Memorial Mall, 3347 Kohler Memorial Drive, #D2, Sheboygan, WI 53081; Kenny, (920) 452-0801

JJ's Dirt Heaven Hobby and Raceway, 6028 County Road K, New Frankview, WI 54229; dirtheaven@msn.com Jeff Jansen (920) 866-9096

Mid-West Tri-Clone, 3745 Shuster, West Bend, WI 53095; Tom Holz, (414) 334-0429

Pro-Star Racing, 726 Pine St., Green Bay, WI 54301; Chuck, (920) 494-1233 or Terry, (920) 469-5566

Revolution Raceway, Memorial Mall, 3347 Kohler Memorial Dr., #D2; Sheboygan, WI 53081; (920) 452-0801 or (800) 594-9420

R.J.S./R.C., 4920 Hwy 70W, Eagle River, WI 54521; Randy Stys, (715)479-2541

S&N's Trackside Hobbies and Raceway, 6045 N. Green Bay Ave., Milwaukee, WI 53209; Scott Ernst, (414) 351-1910

WYOMING

Collectable Creations Off-Road Oval Track, 1790 Dell Range Blvd., Cheyenne, WY 82009; Phil Severson, (307) 632-2156

Wind River R/C Racing Association, 113 S. 3rd E., Riverton, WY 82501; Bob Belding, (307) 857-2068

Xtreme Hobbies Raceway, 2724 Powder Basin, Gillette, WY 82718; Krieg Balls, (307) 682-6077

ARGENTINA

Club A. Velez Sarsfield, Av. J.B. Justo 9000, C.P. 1408, Buenos Aires; Jorge Herrero, 54-01-658-5851

AUSTRALIA

A.C.T. Model Car Racing Club, offroad track—Wanniassa Raceway, Hyland Place, Wanniassa A.C.T.; indoor track—Epic Complex, Northbourne Ave., Canberra North A.C.T.; Gary Davey, 61-6-2871411

Aubry R/C Car Club, Aubry Showgrounds, Aubry, NSW 2640; Ron Langman, 060-247-128

Canberra Off-Road Model Car Club, Goyder St., Narrabundah, ACT 2604; Graham Brown, 61-6-241-3070

Central Coast ORRCC, EDSACC Sports Complex, Bateau Bay, N.S.W. Australia 2261; Peter J. Knight, 61-43-693-698

Fast n' Fun, 250 Potreath Rd., Bellbrae West, Torquay, VIC 3228 Australia; Stephen Chara (613) 5266 1550 or (613) 5266 1556; fax (613) 5266 1556

Illawarra RCECC, Croome Sporting Complex, Albion Park Rail, NSW 2527; Mel or Andrew, 042-714-683

Lakeside R/C Racing Car Club, Hollywood Dr., Lansvale, NSW 2166; R. Bartolozzi, 62-2-907-9800

Melton Electric Circuit Car Association, Safeway Car Parkm Corner High St. and Coburns Rd., Melton, VIC 3337; Arthur Joslin, 61-3-9747-8805

Northern Districts Model Rally Club, Inc., Rear Stanford Centre, 16 Stanford Way, Malaga, Western Austrailia 6066; G. Thirlwell, 61 (9) 249 3855; fax 61 (9) 249 4778; email tony@ois.com.au

Penfield Park, DSTO Complex Salibury, Adelaide, South Australia 5108; Trevor Unsworth, (618) 8289-5010

Templestowe Flat Track Racers, Templestowe Reserve, Corner of Porter St. and Williamsons Rd., Templestowe, Melbourne, Victoria 31066; Renato Benci, 61 (3) 9553 4625

Wodonga R/C Car Club, 11 Murphy St., Wodonga, VIC 3690; Ron Langman, 61-60-247-128

BELGIUM

ATR-Alka-Tele-Racing, 3570 Stationstraat 21, Alken Limburg; 0032-11-25-49-03

Cartroubles Indoor Buggy Track, Jan Moonsstraat 52-56, 2160 Wommelgem, Belgium; Guy Ermes, 32-3-326-51-15; fax 32-3-326-51-01

MBV-Kampenhout, Teniersln 28, Kampenhout B1910, Belgium; Frank Mostrey, phone and fax 0-16-65-75-18

MRCZ, Centrum, De Burg, Belgium; Montie, 75-71-63

Model Racing Club Oudenaarde, Scheldekant, 9700 Oudenaarde, Belgium; A. Chanterie,32-55-31-36-48; fax 32-55-30-19-12

R.C.R., Peilstraat 43, Retie 2470, Belgium; A. Eelen, phone and fax 32-14-379685

BRAZIL

Amoc Cassociaçao de Modelismo B. Camborio, Junto ao Par Que Ecologico de Bal. Camboriu, Bal. Camboriu, S.C. 88.330-000; Leo Cesar, (047) 366-0001

Brasilia R/C Motor Circuit, Estacionamento do Estadio Mane Guarrincha, Brasilia, DF 70000, Brazil; Alexandre (Alex), 55-061-273-7205

C.A.A.R. Curitiba Associacao de Automodelismo Radiocontrolado, Rua Theodoro Makioka, n 2300 Santa Candida, Curitiba, PR Brazil, 82650-530; Ronaldo Assumpcao, 55-41-354-2804

Electric Car Club R/C Santos, Av. Bernardino de Campos, 227, Santos, SP, Brazil, 11065-001; Estevam or Arnaldo, 55-013-232-2536

Hobby Center, SQS.210 Bl.H Apt. 204, Brasilia, DF-Brasil 70.273; 061-242-0488

Hobby Planet Racing Club, Rod Dom Pedro 1, KM 1315, Campinas, Sao Paolo, Brasil 13091901; Daniel, Helio, Luciano, 019 258 2768

Jungle Drive, Rua Alberto Maranhao, No. 219 Icha do Gov, Rio de Janeiro, 21940-490; Paulo Brito (021) 396-0851 or (021) 393-7449

MP Raceway, AV. Nacoes Unidas, 6815 Lapa, Sao Paulo; Gerd Heitrotter, 55-11-9819039; www.hpraceway.com.br

Off Roaders, Av. Guillerme Dummont Villargs, 317, Sao Paulo, CEP 05640; Waldir Ielpo, (055) 011-260-5628; fax (055) 011-831-4931

Way of R/C Off-Road Cerrado, Rua Paraiba 1323, 1st floor, Belo Horizonte, Minas Gerais; Claudio T. Corrêa, (031) 227-6111, fax (031) 227-6869

CANADA

Action Weelz, 462 Turcotte, Vanier, Quebec, G1M 1R6; Regent Tardif, (418) 527-5756

Advance R/C Raceway, 4181 Sheppard Ave. E, Scarborough, Ontario M1S 1T3; Albert Lau,(446) 321-8377

A&J Toronto R/C Raceway, 24 Main St., Building B, Unionville, Ontario L3R 2E4; (905) 305-1479

The All New R.C. World, 2633 Hwy. #6, Mt. Hope, Hamilton, Ontario L0R 1W0; Dave, (905) 765-2301, Larry, (905) 333-3297 or Brian, (519) 752-0044

ATN, Auto Teleguidee Nicolet, 2000 Rue Paul Hubert, Saint-Jean -Baptiste-de-Nicolet, Quebec J3T 1E5; Louis Durand, (819) 293-6097

Auto Sprint, 6065 Des Grands Prairies, St. Leonard, Quebec H3G 2R6; David Kalayjian, (514) 287-3503

Blew Bye You Raceway, 134 Dike Rd., Chilliwack, British Columbia, V2P 5B1; (604) 792-8978

Circuit J.C., 1283 Chemin, St. Philipe, St Polycarpe, Quebec J0P 1X0; Jean Castellon, (514) 265-3675

Circuit Pepsi, Centre de Location, 37 duRoi, Sorel, Quebec; (514) 746-8828

Circuit Plessis, 260 Rang 9 Ouest, Plessisville, Quebec G6L-2Y2; (819) 362-3743

Circuit R/C Pro, 1500 Chemin Sullivan, Vald'Or, Quebec; J9P 1M1; R/C Modeler Plus, (819) 874-3918

Circuit Teleguide St. Roch, 363-B St. Charles, St. Roch De L'Achigan, Quebec J0K 3H0; (514) 588-4254, fax (514) 588-6554

Circuit Teleguide Grand Prix II, 701, Sainte-Rose, Ste. 200 , Quebec, J5R 1Z2; (514) 444-1286

Club Avatt, 244Jules-Richard, Deauville, Quebec JIN 3; Daniel Vanier, (819) 864-6262

Club RCSI, 44 Rue Holliday, Sept-Iles, Quebec G4R; Sylvio Gerard, (418) 968-6575; Hobby Shop, (418) 962-6565

CRCCC, Box 309, Clinton, Ontario NOM 1L0; Eric Russell, (519) 482-9429

CTG, 450 Chemin de la Grand Ligne, Granby, Quebec; (514) 358-4419

CTL, 495 Industriel, Longeuil, Quebec; (514) 358-4419

Dustkickers R/C Raceway,1785 Cypress Rd., Quesnel, British Columbia V2J 4B1; Darrell Dinsdale, (250) 747-2680

Dynamic Hobbies, 21 Concourse Gate, Unit 6, Nepean, Ontario, K2E7S4; Clark Freeman, (613) 225-9634

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Interior R/C Raceway, 34-1605 Summit Dr., Kamloops, BC, V2E 2A5; Martin Vannieuwenhuizen, (604) 374-1268 or (604) 374-8458

J-T International Raceway, 127 Milligan Lane, Napanee, Ontario K7R 8A1; N. O'Neill, (613) 354-0099

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The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o *R/C Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. My Internet address is: chrisc@airage.com.

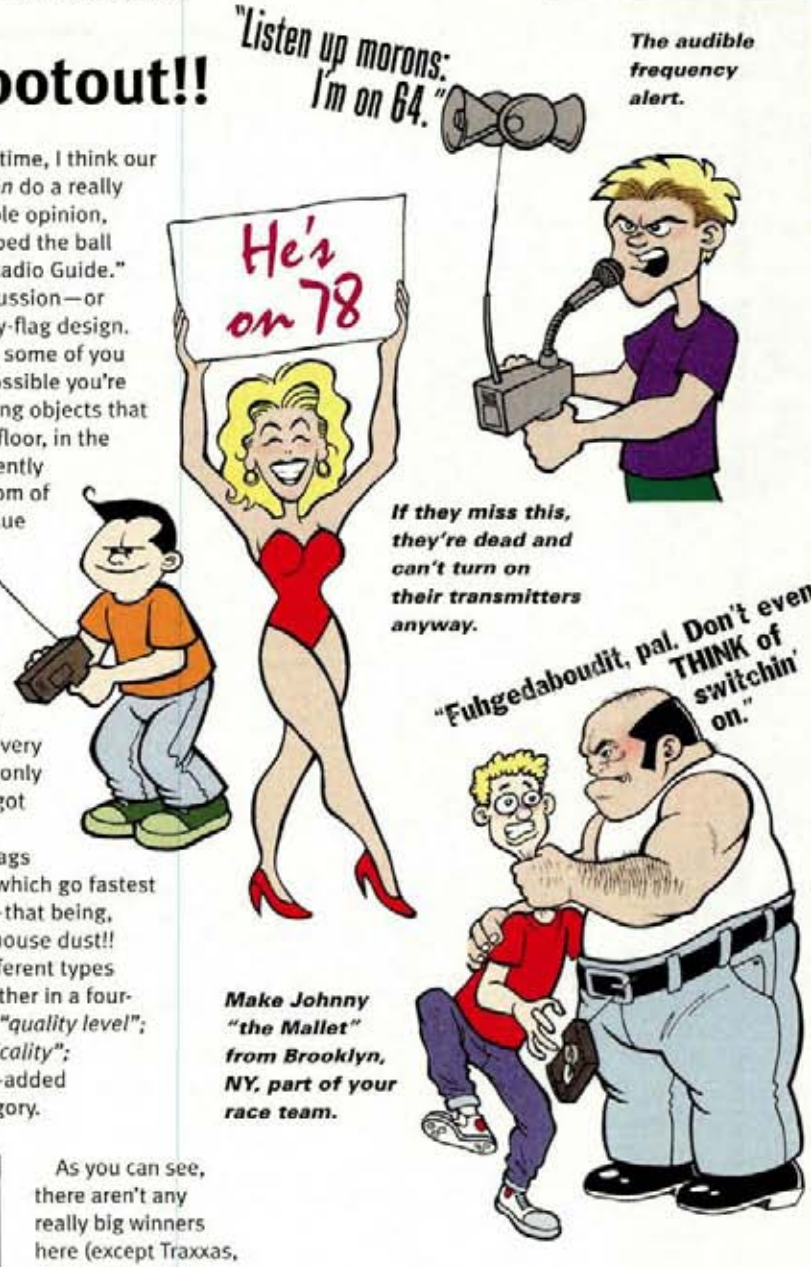
Frequency-flag Shootout!!

BY CHRIS CHIANELLI

You know, most of the time, I think our guys here at *Car Action* do a really great job. In my humble opinion, however, they really dropped the ball this time in the "Budget Radio Guide." I'm talking about the discussion—or lack thereof—of frequency-flag design. I know, I know; right now, some of you are asking, "Chris, is it possible you're referring to those annoying objects that end up on the garage floor, in the car trunk, or permanently plastered to the bottom of your pit box with CA glue and castor oil??" Yes; that's exactly what I'm talking about. Moreover, I think it's important to see why, despite their widely varied designs, they all seem to end up in these very same places, and it's really only a matter of which features got them there first!!

Obviously, a frequency-flags shootout is in order to see which go fastest to their final resting place—that being, with the dead spiders and house dust!!

Below, I've pitted the different types (A, B, C, D) against one another in a four-category grid that includes *"quality level"*; *"annoyance factor"*; *"practicality"*; *"humor value"* and a value-added *"alternate use"* bonus category.



The audible frequency alert.

If they miss this, they're dead and can't turn on their transmitters anyway.

Make Johnny "the Mallet" from Brooklyn, NY, part of your race team.

Scoring is on a scale of 1 to 10 (1 is the lowest score).

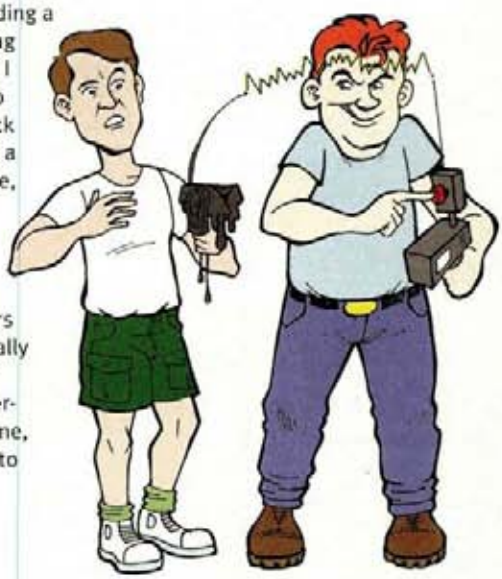
	A	B	C	D
Quality level	1	0.5	-2	2
Annoyance factor	10	10	10	10
Practicality	0	0	0	0
Humor value	5	2	11	-1
Alternate use	*	none	**	none

** Wind direction indicator*

***May be spun with finger while waiting for a corner marshal to notice your car has flipped.*

As you can see, there aren't any really big winners here (except Traxxas, for not including a frequency flag at all!). Now, I really hate to end the "Back Lot" on such a negative note, so I asked the guys to each come up with an alternative—something I call "frequency security devices" (FSDs—see drawings). I mean, just forget the frequency-flag route; except for serving as excellent dead-spider markers when you vacuum your house, they've proven totally useless (especially in the R/C car world). And that's my humid ... I mean *humble* opinion.

My final words are: don't argue with the guy running the transmitter-impound area. His job is tough enough—and, when all is said and done, a strictly controlled impound area has proven to be the best solution to frequency-control problems.



The 1000-watt linear-boost amplifier. At the first sign of a glitch, a push of the button melts all other transmitters (and modelers) within a 100-yard radius.

ILLUSTRATIONS BY PETER VIEIRA

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